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Great Ormond Street Hospital Digital Roadmap

Author: Sarah Trewella, Deputy Director of ICT

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Reviewers

Name	Title/Responsibility	Version Reviewed
Neil Sebire	Chief Research Information Officer	0.1 to 1.0
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Shankar Sridharan	Chief Clinical Information Officer	0.2 to 1.0

Approvals

Name	Date Approved	Version Approved
Ward Priestman (CIO)	27/03/2017	1.1
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ICT Board		-
Executive Management Team (EMT)		-
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Contents

CIO / CCIO / CRIO Forward

GOSH finds itself in the era of widespread digital disruption, consumer technology is becoming increasingly available and more mature. Our staff and our patients expect convenient access to information and services through digital platforms. Commonly available digital technologies and rapidly evolving expectations have altered how patients and healthcare interact – brands are now selected based on the positive clinical outcomes achieved and the experience they offer. To respond, NHS Trusts need to find new ways of focusing on the experience of patients and staff.
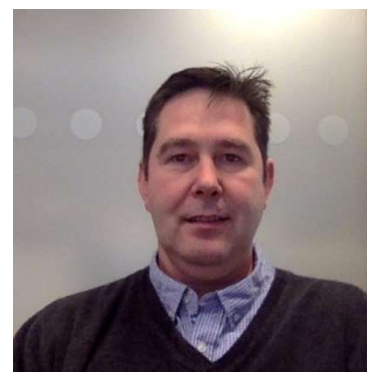
Ward Priestman / CIO

This pervasive disruption forces digital reinvention. Healthcare is evolving as new competitors begin to compete within specific specialities. New types of healthcare environments have emerged that can support seamless, sophisticated clinical care, displacing the traditional healthcare delivery paradigms. To succeed in this disruptive environment, NHS Trusts need to provide services that deliver exceptional clinical outcomes and offer compelling patient experiences. New thinking is required and we need to devise new ways of working promoting digital development to provide exceptional clinical outcomes. Successful digital reinvention involves a fundamental reimagining of how we operate and how we engage with our environment and stakeholders.

Shankar Sridharan / CCIO

As patients, their families and healthcare staff become more used to, and adept in using digital technologies, their expectations of how they should interact with one another also evolves. As medicine moves increasingly towards the use of data analytics at its core; enabling optimum clinical decision-making. The pressure for NHS Trusts is becoming greater to innovate, create and use digital services to deliver better clinical outcomes and improve the overall experience for our patients, staff and stakeholders.

GOSH cannot afford to fall behind in this journey and we need to consider how digital technologies and specific capabilities can improve clinical outcomes. As such, the overarching Digital Roadmap will guide this process and help navigate the era of digital reinvention so that GOSH can continue to improve it's clinical, operational and business decision making.

Neil Sebire / CRIO

Executive Summary

Introduction

Due to the evolution of technology and it's constant, change this roadmap, the associated digital initiatives and projects are not fixed and will require ongoing review to ensure that the roadmap continues to deliver the overall vision and objectives.

The constraints on GOSH's ability to deliver change in the current environment should not be underestimated.

The Digital Steering Group will prioritise projects, oversee and drive the roadmap forward.

This is a major change initiative and needs resource, and considerable organisational support.

It is a long-term programme. Whilst many projects will be able to define quick tangible results in the short to medium term, the overall programme success requires strategic overview and a balanced portfolio of projects.

This means that benefits will increase across the short, medium and longer term and between direct cost savings, service improvements and improved clinical outcomes.

The projects defined within the roadmap will be evaluated and prioritised based on a formal ranking process encompassing factors such as strategic importance, feasibility, delivery timescales and dependency on external resources.

The broad aim is to have a roadmap that will deliver significant and visible clinical and administrative improvements across all areas of the organisation through development of digital technology.

Through accelerated activity, our ambition is to be the leading digital hospital globally in order to retain our reputation as one of the best children's hospitals in the world, delivering the best possible outcomes for our patients and providing exceptional patient experience and research breakthroughs

Digital Vision

The Digital Roadmap will support the core GOSH vision of putting the child first and always. Key to this will be to remain true to the core values. The GOSH Digital Roadmap will therefore:

- Support GOSH's mission to put children at the heart of everything we do
- Support the 'Always' Values:
- Support GOSH's key priorities:
    o Safety – to reduce all harm to zero
    o Effectiveness – to demonstrate clinical outcomes
    o Experience – to deliver an excellent experience
    o Research
- Be guided by a set of overarching aims:
    o Clinical and operational decisions based on high quality data
    o The use of data optimised for research to improve child health
    o Maximise benefits of adoption of technological advances
    o Analysis of evidence of data to improve operational outcomes and patient experience

VISION	**GOSH Vision** *The Child first and always*
	GOSH Digital Vision *Providing the best possible clinical outcomes to our patients by enabling digital technologies*

Strategic Aims and Digital Enablers

To achieve the vision and remain true to the GOSH values, the following strategic aims and enablers have been defined as part of the Digital Roadmap:

	Improve clinical outcomes	Improve Quality and Efficiency	Improve Experience	Improve Interactions	Improve Research & Innovation
STRATEGIC AIMS and ENABLERS	*Digital Enablers for clinical Improvements*	*Digital enablers for Quality & efficiency Improvements*	*Digital enablers for Patient, Family and Staff Experience*	*Digital Enablers for Process & Data Improvements*	*Digital Enablers for pioneering and breakthroughs*

💡 ***Click on a Strategic Aim above to view the Digital Principals***

Digital Initiatives

The defined Digital Initiatives reflect GOSH's clinical and business priorities. Its purpose is to structure and deliver the initiatives in a way that links them back to the Strategic Aims and GOSH vision.

DIGITAL INITIATIVES	Digital solutions in Clinical Services	Digital solutions in Patient & Staff Safety	Digital solutions to enhance patient, family & staff experience	Digital solutions in patient administrative services & interaction	Digital solutions to facilitate research
	Digital solutions in Access to Care Pathways	Digital solutions in Error Reduction	Digital solutions in providing information to patients & families	Digital solutions in access to patient data and devices	Digital solutions to integrate research into clinical care
	Digital solutions in Access to Cognitive Decision Support	Digital solutions in processes, outcomes & predictive analytics	Digital solutions in collaborative care plans	Digital solutions in decision making data available	Digital solutions to accelerate pioneering and breakthroughs
	Digital solutions in Access to Patient Data	Digital solutions in Regulatory Reporting	Digital solutions in hospital environment & returning the patient to normal life	Digital solutions in internal interactions	Digital solutions to educate

Click on an Initiative above to view the related projects

Governance

Digital transformation can provide significant benefits to our patients, families, staff and other stakeholders. However, one area of GOSH cannot deliver digital alone. Everyone needs to see opportunities to improve services and adapt the way we work.

The Digital Roadmap is a wide-ranging ambitious programme of change. As such, robust governance will be required to ensure that the programme remains on track, new initiatives assessed and prioritised and all divisions and departments are fully engaged to deliver the digital agenda.
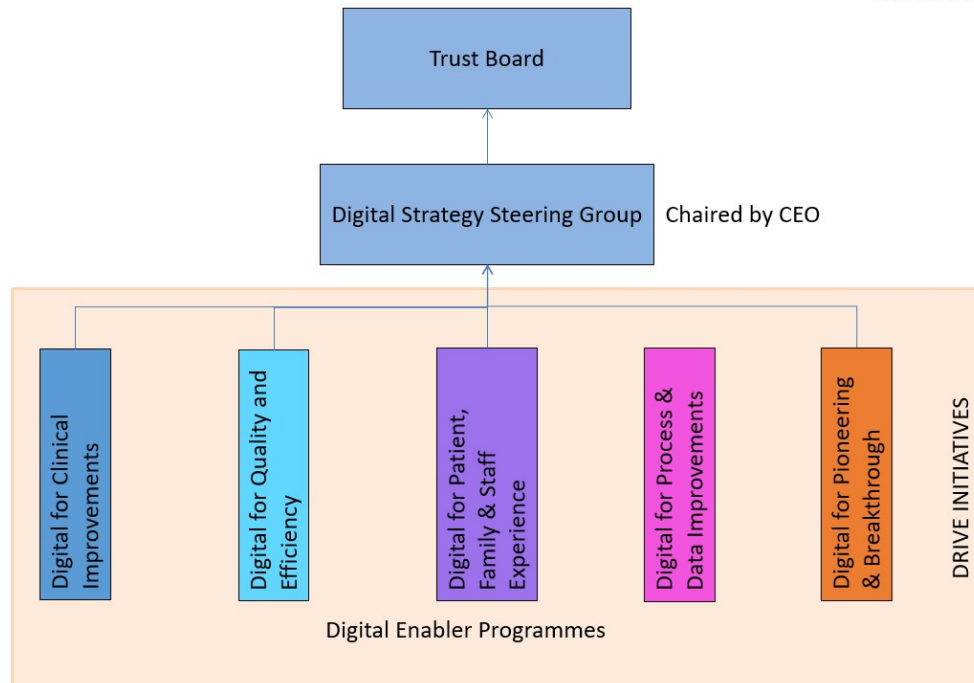
The Digital Roadmap should be reviewed annually to ensure that it continues to drive innovation and take advantage of the most up to date technologies.

Prioritisation and DRIVE

In order to deliver the Digital Initiatives it is essential that we focus on innovation and prioritise projects.

Innovation is key to ensuring that we are always looking forward to evaluating new and emerging technologies that can support patient care and achieve improved clinical outcomes for our patients. As such GOSH will create an innovation concept branded as 'DRIVE' (Digital Research Innovation and Virtual Environment).

GOSH DRIVE will provide an operational framework for strategic developments, project management and development of aspects of the Digital Roadmap, particularly those outside of core infrastructure and operational EPR support. It will include both a management structure and physical space for development, aimed at:

- Support the Digital Roadmap / future hospital
- Support the Research Hospital vision and act as an exemplar for other academic centres
- Maximise existing research opportunities (quality, speed, volume)
- Develop novel research clinical informatics activity
- Develop informatics capabilities to improve operational efficiency / decision making
- Develop technological collaborations with partners (industry, academic and healthcare)

GOSH DRIVE will sit under the responsibilities of the CIO, CCIO and CRIO and will act as the focus for research, innovation and development of all aspects of clinical informatics expertise and training.

The focused GOSH DRIVE Centre, as a physical unit, will include partners from GOSH, academia, healthcare and industry to develop, test and improve their ideas, with rapid embedding into clinical practice to exploit new opportunities for the NHS as a whole.

The overall intention of GOSH DRIVE is to bring together the expertise, people and ideas of all those working with data and digital technologies together with GOSH, the wider NHS and industry partners to develop digital technologies to improve patient outcome and experience. In addition, the unit will increase learning capability in clinical informatics and help develop the next generation of clinical informaticians. It will also significantly accelerate the ability to conduct robust development of digital health technologies and innovative pathways for patient centred care.

Projects identified as part of this roadmap (detailed under section 4.1.2) and those identified under the 'DRIVE' Initiative will be subject to a prioritisation matrix. Scoring has been attributed to each of the following elements:

1. Strategic Importance
2. Feasibility
3. Affordability
4. Non GOSH Dependent (i.e. external suppliers/resources will be required)
5. Delivery Timescale

Each project has been reviewed and a score* applied to each element described above. The score will dictate the priority within the Digital Roadmap

The priority over the first 18 months will be to implement the digital solutions that are included within the Epic and Aridhia implementations and to develop partner relationships.

The projects identified as part of this roadmap have undergone an initial assessment score. These scores and therefore the prioritisation will be ratified at the first Digital Steering Group.

*Score of 1 to 10 has been applied. 1 being low and 10 being high.

Funding

There are ninety-one projects identified to deliver the digital initiatives that form part of the Digital Roadmap.

Two of these projects would utilise digital capability already implemented at GOSH. A further fifteen projects would be full met by the Epic and Aridhia implementations, funding for these is therefore already included in the EPR business Case.

Fifty-Three projects will be partially achieved by the Epic/Aridhia implementations and the final twenty-one are new initiatives that would require funding. These projects been reviewed through creating a business case and would be initiated once funding can be secured from partners and or savings identified from existing budgets.

NHS Context

Over the past few years, the NHS nationally has developed a number of national policies and guidelines in relation to implementing digital. These policies and guidelines demonstrate a clear alignment to the GOSH digital roadmap as follows:

NHS 5 Year Forward View	The NHS Five Year Forward View (5YFV) released in October 2014, sets out the future direction of the NHS by identifying the current gaps in the healthcare system, ambitions for the future in terms of new care models and the enablers for successful delivery of these models. It states that new technologies and ways of working must be encouraged and harnessed to improve the quality of care and patient experience and reduce unacceptable variations in patient outcomes. It also makes a commitment that, by 2020, there will be 'fully interoperable electronic health records so that patient's records are paperless'.
North Central London Local Digital Roadmap (LDR)	In October 2015 seven Local Digital Roadmap footprints were established for London. Each footprint comprised a single CCG/partnership of neighbouring CGG's as well as Providers, Local Authorities and Health and Wellbeing Boards. Great Ormond Street Hospital fell within the North Central London footprint The North Central London Local Digital Roadmap was developed in collaboration with the relevant (22) organisations and five themes were developed to underpin the vision and ambition as follows: 1. **Digitally activated population:** We will provide our citizens with the ability to transact with healthcare services digitally, giving them access to their personal health and care information and equipping them with tools which enable them to actively manage their own health and wellbeing 2. **Connected care:** We will create and share care records and plans that can be shared across health and care systems seamlessly to enable integrated care delivery across organisations.

	3. **Insights driven health system**: We will use data collected at the point of care to identify populations at risk, to monitor the effectiveness of interventions on patients with established disease and deliver whole systems intelligence so the needs of our entire population can be predicted and met 4. **Digitally enabled workforce**: We will support our providers to move away from paper to fully digital care processes and provide infrastructure which enables our care professionals to work and communicate effectively, anywhere at any time 5. **Sustainable Care**: We will improve efficiency and productivity through consolidation of digital services, applications and projects
National Information Board – Framework for Action	In November 2014, the National Information Board published 'Personalised Health and Care 2020 – Using Data and Technology to Transform Outcomes for Patients and Citizens: A Framework for Action'. The framework highlights that better use of data and technology has the power to improve health, transforming the quality and reducing the cost of health and care services. It can give patients and citizens more control over their health and wellbeing, empower carers, reduce the administrative burden for care professionals, and supports the development of new medicines and treatments.
NHS England – Transforming Child Health information	In November 2016, NHS England published 'Healthy Children – Transforming Child Health Information' which sets out a transformation Programme on using child health information to support families in providing high quality care for children. Based on feedback from different groups such as patients, families, care professionals, providers and suppliers of information systems it concludes that the vision for child health information services would need to achieve two objectives: Knowing where every child is and how healthy they are. Appropriate access to information for all involved in the care of children.
Care Quality Commission	The 'Safe Data, Safe Care' report published by the CQC in July 2016, reviewed the effectiveness of current approaches to data security within NHS organisations and provided recommendations for improvement. The key themes and recommendations within this report were: Good information underpins good care. Patient safety can only be assured when information is accessible, its integrity is protected against loss or damage and confidentiality is maintained. All staff should be provided with the right information, tools, training and support that would enable them to do their jobs effectively and meet their responsibilities for handling and sharing data. IT systems and all data security protocols should be designed around the needs of patient care and frontline staff to remove the need for workarounds, which in turn introduce risks into the system. Computer hardware and software that can no longer be supported should be replaced as a matter of urgency. Maintaining data integrity and security is challenging in a paper-based environment, where patient information is scattered. If GOSH fails to demonstrate the strength of its data security standards, there is a significant risk that the Trust would be found to be non-complaint during future CQC reviews which will include a review of digital maturity.

Summary

The rate of change in technology is rapid and growth in the uptake of technologies by the general public such as mobile devices, social media, high-speed broadband and open data present huge opportunities for GOSH, as do the technology advances in healthcare provision from manufacturers and suppliers.

In order to benefit from the advances in technology, meet the increasing expectation of our patients, and staff it is imperative that GOSH has a clear and progressive approach to continuously improving services in order to achieve a truly digital hospital.

The Digital Roadmap will pave the way for GOSH to achieve its ambition of becoming a world leading digital hospital by setting out initiatives; driving innovation and prioritising projects that will help improve patient outcomes and provide a better experience to our patients.

********* End of Executive Summary ********

1.0 Introduction

GOSH has the ambition to become one of the most digitally advanced children's hospitals in the world, helping us to deliver the best possible patient outcomes, achieve exceptional patient experiences, deliver research breakthroughs and retain its reputation as being one of the leading children's hospitals in the world. During November 2016 detailed clinical engagement was undertaken to help understand the daily clinical challenges and to help envision the GOSH digital roadmap.

The aim was to understand the current state of GOSH from a digital capability perspective, capture the high-level requirements of its key stakeholders in terms of identifying digital solutions and describe the future vision of the digital hospital that GOSH aspires to become.

Stakeholders throughout the organisation engaged in various meetings, interviews and workshops (detailed list shown in Appendix A). The current state problems, future state aspirations, potential opportunities were outlined and assessed within the digital roadmap.

Throughout the process, it was imperative that any digital reinvention would need to remain true to the core values and strategic clinical vision of GOSH. Therefore, the GOSH Digital Roadmap will:

- Support GOSH's mission to put children at the heart of everything we do
- Support the 'Always' Values:
    o Welcoming
    o Helpful
    o Expert
    o One Team
- Support GOSH's key priorities:
    o Safety – to reduce all harm to zero
    o Effectiveness – to demonstrate clinical outcomes
    o Experience – to deliver an excellent experience
    o Research
- Be guided by a set of overarching aims:
    o Clinical and operational decisions based on high quality data
    o The use of data optimised for research to improve child health
    o Maximise benefits of adoption of technological advances
    o Analysis of evidence of data to improve operational outcomes and patient experience

In order to achieve the above alignment, a Digital Strategic Framework (shown in the schematic below) was created and refined.

The framework reflects GOSH's clinical and business priorities. Its purpose is to structure the digital capabilities, digital initiatives and associated projects to deliver them in a way that ensures everything links back to the Priorities and Vision of GOSH.

The digital capabilities and initiatives that make up the Digital Roadmap will need to fit into this framework. If in the future, a specific requirement encountered and its associated digital capability does not fit in any of the digital initiative groupings. Then either the capability will not contribute to achieving the vision and priorities of GOSH and thus its inclusion in the Roadmap should be seriously questioned, or the framework will need to be amended to account for the gap.

GOSH Digital Strategic Framework

	GOSH Vision				
VISION	**The Child first and always**				
	GOSH Digital Vision				
	Providing the best possible clinical outcomes to our patients by enabling digital technologies				
	Improve clinical outcomes	**Improve Quality and Efficiency**	**Improve Experience**	**Improve Interactions**	**Improve Research & Innovation**
STRATEGIC AIMS and ENABLERS	*Digital Enablers for clinical Improvements*	*Digital enablers for Quality & efficiency Improvements*	*Digital enablers for Patient, Family and Staff Experience*	*Digital Enablers for Process & Data Improvements*	*Digital Enablers for pioneering and breakthroughs*
INITIATIVES	Digital solutions in Clinical Services	Digital solutions in Patient & Staff Safety	Digital solutions to enhance patient, family & staff experience	Digital solutions in patient administrative services & interaction	Digital solutions to facilitate research
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Digital working requires a revolution in thinking. Through the research undertaken in constructing this roadmap, we were inundated with innovative ideas, fresh thinking, frustrations around current practice/processes and simply obvious changes that need to be made. We've also uncovered emerging ideas and technologies that will undoubtedly require a further change in thinking and we need to be prepared to approach patient care and service delivery in a completely new way if we are to fully take advantage of the benefits digital services have to offer.

In a world where technology is not only constantly changing, but also doing so at an amazing rate, we have not tried to aim for perfection in finalising it.

The idea of accelerating change, of embracing new ideas, of going live with early prototypes and iterating is a fundamental principle of working in a digital world. The same applies to this roadmap which must be continually reviewed as new ideas and innovations are developed.

The Digital Roadmap is a collaborative framework – it has been produced with the input from a large number of clinical and non-clinical staff across multiple specialities and departments and digital working allows us to continue to collaborate as it develops. The roadmap envisages working across all divisions in pursuit of joined up outcomes of clinical care.

It is not simply about online services. Whilst these provide a core part of our 'digital front door' the digital roadmap reaches across all of our services and investment in technologies to support our front line staff is an equally important component.

The Digital Roadmap is not a technology programme. Whilst the work has to date been led by the three c's, the technology is only one ingredient. The most important ingredient is the people, our staff, our patients and our suppliers.

The roadmap will be overseen, driven and managed by the Digital Steering Group, chaired by the GOSH CEO.

Prioritisation. Prioritising the projects defined under the Digital initiatives will be an essential part of delivering the Digital Roadmap effectively. Prioritising is about making choices of what we will do, when, and what we will not do. To prioritise effectively a mechanism has been produced to assess priorities based on scoring the strategic importance, feasibility, affordability, the dependency on external resources and the delivery timescales. The Digital Steering Group will validate the scores and monitor progress on an ongoing basis.

The Digital Roadmap will require new investment. The vast majority of GOSH's Technology Services staff and budgets are allocated to existing systems, supporting our clinicians to deliver patient care focusing on today's initiatives. However, we need to accelerate our digital change and define what tomorrow's services need to be and how we can deliver them.

It does not need to be a leap of faith however. We know there are opportunities to improve our services, to serve demand and to improve clinical outcomes. We know our roadmap can and will deliver real efficiencies and real savings.

Acceleration is key. In this roadmap, we have outlined the broad building blocks that will enable GOSH in accelerating its inevitable journey towards more digital working.

This is a wide ranging and ambitious programme of change and reform.

It is also essential.

We have to have the courage and conviction that we can and will harness the power of digital and can do so with increasing pace.

2.0 Why We Need a Digital Roadmap

2.1 Demand and Opportunity

The construction of the Digital Roadmap for GOSH commenced with assistance from our partners from IBM. The initial assessments carried out by IBM focused on the requirement for a digital roadmap and the confirmation that a roadmap was required.

Our IBM Partners and our "digital champions" (list in Appendix A) helped scope other jurisdictions to determine the digital landscape, both generally and specifically in areas that were comparable to our services. In doing so, we confirmed that many sectors have clear digital strategies, or key reform strategies that are focused on digital themes to support its delivery. These are required for GOSH to support NHS digital transformation.

We set up workshops to discuss what was working well, consider areas for improvements in both clinical care and non-clinical services, to seek new ideas for change. We looked further afield into other industries to gather specific ideas and the general direction.

Two themes emerged throughout this process, **Demand** and **Opportunity**.

Without exception through all the input provided, there was a clear **demand** for more patient/clinical services to be delivered or supported using digital means.

Additionally, the evidence showed overwhelming that in order to harness the **opportunities** to reduce cost, improve services and ultimately improve clinical outcomes; we need to embrace greater us of digital services.

Against a backdrop of financial challenge, increasing pace, increasing demand, complexity and opportunity. An overall roadmap to set down the general direction of travel, together with specific initiatives that will support the acceleration of priority projects and the realisation of benefits is as a critical framework to maximise the benefits for the organisation, its patients, staff and other stakeholders.

2.2 The Digital Journey So Far

2.2.1 The ICT Strategy and Approach

The previous GOSH ICT strategy focused on a 'best of breed' approach (utilising the best system for different processes and integrating where appropriate). At the time, given the technology available and funding it that was considered the most appropriate choice for GOSH to deliver its digital vision. However, as technology has moved on and the reliance on digital has increased, it is no longer safe to assume that a best of breed approach is the right choice for GOSH.

An assessment of that strategy found that the benefit of having rich functionality designed for specific processes is preferable to the complexities that exist with a 'best of breed' approach, as follows:

- Multiple Costly Licencing Requirements
- Complex Maintenance Contracts
- Multiple Vendors to Manage
- Multiple Training Requirements
- Complex Support and Multiple Service Level Agreements in play
- Complex Data Sharing
- Higher requirement for Administration and general Maintenance
- Not easy to use, multiple passwords and logins required

A review of the previous strategy resulted in a change of direction, which requires a new roadmap to support the requirements of a digital hospital.

2.2.2 GOSH Digital Maturity / Digital Baseline

The NHS England Digital Maturity Assessment measures the extent to which healthcare services are supported by the effective use of digital technology. The result helps identify key strengths and gaps in a healthcare provider's provision of digital services at the point of care and offers an initial view of the current 'baseline' position.

Currently GOSH are at stage 3, which is the lower left quadrant. This result identifies us as having some foundational IT capabilities but we are below the national average compared to other NHS organisations:
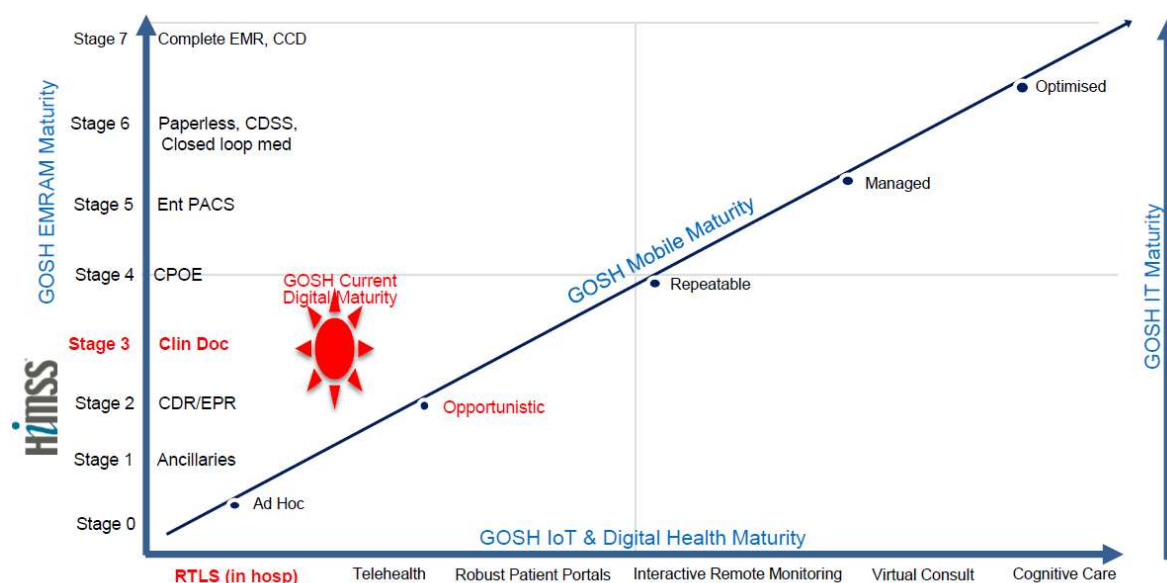
2.3 Context

2.3.1 NHS Digital Vision

The table below summarises a number of recent and relevant national policies and guidelines. These policies and guidelines demonstrate that there is a clear alignment towards increasing digitisation in the provision of healthcare and the use of technology to improve clinical quality and research outcomes. An EPR will mean that GOSH is compliant with NHS requirements for digitisation and paperless records and place GOSH at the forefront of the move towards becoming a digital hospital.

The key themes noted across the national policies and guidelines are:

- The NHS needs to exploit the information revolution to address the widening health and wellbeing gap, care and quality gap and funding and efficiency gap;
- There is national level support for providers moving to a paperless environment, supported by electronic health records;
- Systems need to interface with patient applications in a way that is convenient and in line with patient and family expectations, to support management of patients' own care;
- The systems should bring together provider organisations (such as GPs, community care) by having the ability to integrate across organisations;
- Technology provides the opportunity for better collection of data, which in turn enables analysis and better decision-making to support improved patient care.

NHS 5 Year Forward View	The NHS Five Year Forward View (5YFV) released in October 2014, sets out the future direction of the NHS by identifying the current gaps in the healthcare system, ambitions for the future in terms of new care models and the enablers for successful delivery of these models. It identifies how the health service needs to evolve to address three widening gaps:
	The health and wellbeing gap.
	The care and quality gap.
	The funding and efficiency gap.
	It states that new technologies and ways of working must be encouraged and harnessed to improve the quality of care and patient experience and reduce unacceptable variations in patient outcomes. It also makes a commitment that, by 2020, there will be 'fully interoperable electronic health records so that patient's records are paperless'. This was further developed by the National Information Board (NIB) into a framework for harnessing the power of data and technology to transform patients' experience of health services and improve its' quality and efficiency.
	The proposed EPR will respond to the health and wellbeing gap and care and quality gap by improving engagement with patients and transforming the way care is provided through better decision support and research enabled treatment. The EPR also enables realisation of operational efficiencies and savings which addresses the funding and efficiency gap.
North Central London Local Digital Roadmap (LDR)	In October 2015 seven Local Digital Roadmap footprints were established for London. Each footprint comprised a single CCG/partnership of neighbouring CGG's as well as Providers, Local Authorities and Health and Wellbeing Boards. Great Ormond Street Hospital fell within the North Central London footprint
	The North Central London Local Digital Roadmap was developed in collaboration with the relevant (22) organisations and five themes were developed to underpin the vision and ambition as follows:
	1. **Digitally activated population:** We will provide our citizens with the ability to transact with healthcare services digitally, giving them access to their personal health and care information and equipping them with tools which enable them to actively manage their own health and wellbeing
	2. **Connected care:** We will create and share care records and plans that can be shared across health and care systems seamlessly to enable integrated care delivery across organisations.
	3. **Insights driven health system**: We will use data collected at the point of care to identify populations at risk, to monitor the effectiveness of interventions on patients with established disease and deliver whole systems intelligence so the needs of our entire population can be predicted and met
	4. **Digitally enabled workforce**: We will support our providers to move away from paper to fully digital care processes and provide infrastructure which enables our care professionals to work and communicate effectively, anywhere at any time
	5. **Sustainable Care**: We will improve efficiency and productivity through consolidation of digital services, applications and projects

National Information Board – Framework for Action	In November 2014, the National Information Board published 'Personalised Health and Care 2020 – Using Data and Technology to Transform Outcomes for Patients and Citizens: A Framework for Action'.
	The framework highlights that better use of data and technology has the power to improve health, transforming the quality and reducing the cost of health and care services. It can give patients and citizens more control over their health and wellbeing, empower carers, reduce the administrative burden for care professionals, and supports the development of new medicines and treatments[1].
	Key elements of the road maps published by the NIB include[2]:
	Fully interoperable electronic health records so that patient records are largely paperless. Patients will have full access to these records, and be able to write into them.
	An expanding set of NHS accredited health apps that patients will be able to use to organise and manage their own health and care.
	Bringing together hospital, GP, administrative and audit data to support the quality improvement, research, and the identification of patients who most need health and social care support.
	Comprehensive transparency of performance data – Including results of treatment and what patients and carers say – To help health professions see how they are performing compared to others and improve.
	The EPR will provide patients access to their records electronically, supporting them to manage their own care and control their personal information. The rich data source within the EPR and data analytics supports diagnoses, clinical decision making and continuous performance management.
NHS England – Transforming Child Health information	In November 2016, NHS England published 'Healthy Children – Transforming Child Health Information' which sets out a transformation Programme on using child health information to support families in providing high quality care for children. Based on feedback from different groups such as patients, families, care professionals, providers and suppliers of information systems it concludes that the vision for child health information services would need to achieve two objectives:
	Knowing where every child is and how healthy they are.
	Appropriate access to information for all involved in the care of children.
	To deliver above vision, NHS England proposes an event driven model to build a Digital Child Health Hub. Information is exchanged in real time as a series of events, based on a consent framework. This replaces the current child health information services which is based on organisational health systems which are not integrated and therefore is reliant on paper based communication.
	The new model does not mean building a large new child health information system nationally, but is based on the different organisation systems continuing to collect child health information but being able to share relevant 'events' with other systems within the organisation.

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[1] National Information Board – Personalised Health and Care 2020: Using Data and Technology to Transform Outcomes for Patients and Citizens (November 2014).

[2] NHS England – Five Year Forward View (October 2014).

An electronic information system is vital in delivering the above event based model – 'Exchange of information electronically is the only way an up to date overview of the child's health can be maintained when delivery and commissioning of care is distributed across many organisations. A system reliant on paper will inevitably fail due to the number of events needing to be distributed and the time and resources needed to distribute/uptake the information manually.'

This reconfirms the urgency of the requirement to implement an EPR at GOSH and the repercussions of continuing to operate in a paper heavy environment.

Health and Social Care Information Centre (HSCIC)	The HSCIC Strategy sets out its key objectives for 2015-2020 to achieve its vision of providing all citizens and healthcare professionals with access to better data: Ensuring that every citizens' data is protected and provide them with the confidence that their personal data is handled safely and securely. Supporting health and care organisations to get the best from technology, data and information. Making better use of health and care information that would allow citizens to make informed choices about their own care, help healthcare professionals make better and safer decisions, support policy makers and provide research organisations with the information they need. All of the above will be enabled by the proposed EPR in the context of GOSH and its patients.
Care Quality Commission	Speaking at the NHS Innovations Expo event in 2015, the Health Secretary announced a number of measures to assure the security of confidential information, including a review of security standards by the CQC. The 'Safe Data, Safe Care' report published by the CQC in July 2016, reviewed the effectiveness of current approaches to data security within NHS organisations and provided recommendations for improvement. The key themes and recommendations within this report were: Good information underpins good care. Patient safety can only be assured when information is accessible, its integrity is protected against loss or damage and confidentiality is maintained. All staff should be provided with the right information, tools, training and support that would enable them to do their jobs effectively and meet their responsibilities for handling and sharing data. IT systems and all data security protocols should be designed around the needs of patient care and frontline staff to remove the need for workarounds, which in turn introduce risks into the system. Computer hardware and software that can no longer be supported should be replaced as a matter of urgency. Maintaining data integrity and security is challenging in a paper based environment, where patient information is scattered. If GOSH fails to demonstrate the strength of its data security standards, there is a significant risk that the Trust would be found to be non-complaint during future CQC reviews which will include a review of digital maturity.
Making IT Work:	Professor Robert Wachter is a prominent academic physician from the US who (at the request of the Secretary of State for Health) led a detailed review of the implementation of

Harnessing the Power of Health Information Technology to Improve Care in England (Wachter Review)	information technology in the NHS, with a particular focus on the introduction of clinical systems, including electronic health records, in the acute sector. The findings of the review were released in September 2016 and include: Return on investment from digitisation is not just financial and are more likely to come in the form of improvement in quality and safety. While privacy is important, it's easy for privacy to hinder data sharing that is desirable for patient care and research. The report recommends the use of National Data Guardian's Review of Data Security, Consent, and Opt-Outs in order to achieve this balance. Health Information Technology systems must be designed with the input of the end users. The deployment period of a health IT system is just the beginning and the organisation needs to expect that there may be a short term slowdown of activity and unanticipated consequences following implementation. Successful implementation of Health IT requires not only technical but also adaptive change, requiring engagement and support from leadership and front line staff using the system. Relevant recommendations in the Wachter review are: Developing a group of clinicians trained in Informatics with appropriate levels of authority and resources. It is suggested that an average Trust would need a minimum of five such individuals on staff, led by the Chief Clinical Information Officer (CCIO). All Trusts should have achieved a high degree of digital maturity by 2023 and any Trust that has not achieved digitisation by this time would be considered to be non-compliant on quality and safety. Ensure interoperability between organisations as a core characteristic of Information Technology systems to support clinical care, innovation and research. In line with the above findings in the Wachter review, GOSH is mainly driven by the qualitative benefits of the EPR (i.e. the improved patient experience, patient safety and quality of care) while acknowledging that there are significant financial benefits and recognises the cultural change required to realise the full potential of the EPR.
Other relevant reports	The **Lord Carter Report** (2016) assessed efficiency across 22 NHS hospitals with the aim of identifying the opportunity for efficiency savings. The report states that 'To optimise quality and efficiency across the entire care pathway, a single version of the truth and an integrated performance framework is critical….such a framework also requires hospitals to improve their use of modern digital technology. The best performing hospital systems around the world have real time monitoring and reporting at their fingertips enabling them to make decisions on a daily, weekly, month basis to improve quality and efficiency performance.' The **Keogh Report** (2013) on hospitals with higher mortality rates highlighted that all trusts must understand more about the care they provide to patients and develop a consistent approach to continuous improvement in quality. The **Berwick Review** (2013) into patient safety has significant implications for NHS providers, stating that, *'the single most important change in the NHS…. would be for it to become, more than ever before, a system devoted to continual learning and improvement of patient care top to bottom and end to end'.*

3.0 Vision & Aims

In 2016 the NHS performed a benchmarking exercise assessing all Trusts digital maturity, locally GOSH was ranked as one of the lowest trusts in the north central London footprint and nationally GOSH is in the bottom 10% of all NHS Trusts. It is clear that for GOSH to continue to be a world leading institution we needed to invest in digital technologies or continue to be fall behind.
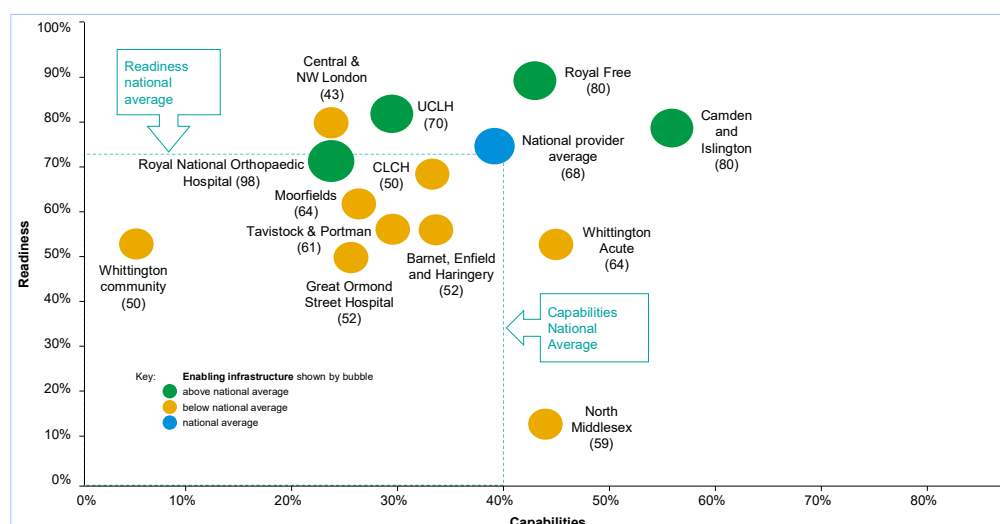
Fundamental change to the way GOSH operates can only be achieved by the introduction of new digital solutions to support transformational change. The Digital Roadmap will support clinicians, as they strive to deliver effective and innovative clinical care to achieve the most effective clinical outcomes. It will support managers and administrative staff by providing them with modern efficient tools to manage patient activity efficiently whilst reducing the administrative burden.

Through extensive stakeholder engagement and a review of leading practices GOSH has defined a comprehensive set of digital initiatives that will support the vision and improve clinical outcomes, quality, efficiency, experience, interaction and research.

To realise the benefits of a digital hospital the digital roadmap is enabled by five supporting strategies. The EPR strategy, Information strategy, Technology strategy, cyber security strategy and data quality strategy all combine to provide the foundations for the digital hospital.

The digital roadmap leverages the power of the data that will be generated from the EPR, smart devices, sensors, our patients and looks to use advanced technology such as cognitive computing to analyse that data in real time. The aim is to help avoid incidents/harm, speed up diagnosis, support clinician's decisions and eventually to aid in direct clinical care as appropriate.

DRIVE
Lot 2
Lot 1

Digital Roadmap

Research & Innovation

EPR

Patients & Families

Staff

Robotics — Smart Buildings
Cognitive computing — Social Media
GOSH specific assistants 'Siri/Alexa etc' — Digital by default
Genomics — Quality Data — Cloud first
App support and Integration — Cloud Powered Analytics
Real time algorithmic CDS — Voice Control
Advanced Tools — Patient Recorded Data — Telehealth — Collaboration between Institutions
Medical decision making analytics — Single Patient Record — Mobile Working — Advanced Asset tracking
Research Portal — Real-Time Data
Richer Data Sets — Paper-lite Hospital — Resource Scheduling — Internet of Things — Predictive activity modelling using open data
AI supported MDTs — Full hospital Digitisation — Connectivity with other organizations — Decision Support — De-identification
'Virtual child' training — Automated image analysis — Capacity & Flow Management — Process Automation — Artificial Intelligence — Novel security: blockchain
Personalised patient robots / assistants — Telemedicine/ teleconsultation — Real Time Data Capture — Analytics & Risk Management — External Data Integration — Clinical informatics staff development
Smart devices — Care Pathways & standard workflows — Research and clinical consent — Clinical informatician training
Novel 'cognitive' staff training programmes — Research outcomes embedded into EPR — Sensor & Medical Device Data — Informatics embedded into recruitment
Augmented reality clinical support — Virtual / Augmented reality training

Great Ormond Street Hospital for Children
NHS Foundation Trust

4.0 How the Roadmap Will Be Delivered

4.1 Actions and Plans

4.1.2 Digital Programme

In support of our vision, the Digital Roadmap includes the programmes required to support GOSH in becoming one of the most digitally advanced hospitals globally.

Our digital programmes define for the first time in one place our existing and proposed digital journeys across the various processes that will all individually support the vision and the strategic

aims. The detail in these areas will develop in the coming months as each programme develops. Progress will be reported to the Digital Steering Group as the strategy develops.

Each of the Programmes defined has been linked back to the Digital Strategic Framework and defined in groups, as follows:

- Clinical Outcomes
    - Clinical Services
    - Access to Care Pathways
    - Access to Cognitive Decision Support
- Quality & Efficiency
    - Patient & Staff Safety
    - Error Reduction
    - Processes Outcomes & Predictive Analytics
    - Regulatory Reporting
- Experience
    - Enhance Patients & Family & Staff Experience
    - Providing Information to Patients & Family
    - Collaborative Care Plans
    - Hospital Environment and Bringing Patient Back to Normal Life
- Interactions: Processes & Data
    - Patient Administrative Services & Interaction
    - Access to Patient Data & Devices
    - Decision Making Data Available
    - Internal Interactions
- Research & Innovation
    - Facilitate Research
    - Integrate Research into Clinical Care
    - Accelerate Pioneering & Breakthrough
    - Educate

Improve Clinical Outcomes

Digital Solutions in Clinical Services

Ref	Project Title	Current state	Action Plan	Supported by EPR or Existing Capability	Priority Score
CS1	**Capacity Management and Appointment Scheduling**	Inability to manage the demand and supply of patient appointments results in suboptimal planning of services.	Solution that allows capacity management and appointment scheduling by learning from history of patient appointments and emergencies and by performing predictive analytics.	Epic implementation will help manage capacity but probably not through predictive analytics, that will need to be provided additionally.	33
CS2	**Smart Capacity Management and Smart Hospital**	Various areas are working outside of designated hours as the organization is not currently set up to support the work required. At 85% capacity GOSH is busier than other private hospitals, and no capacity to take in new patients. Outpatient areas have too much demand on them. This all impacts patient, parent, and staff satisfaction.	Solution that has appropriate clinical service and levels of care based on capacity and demand. SmartRooms, smart hospitals, and cognitive scheduling will all contrive to the operation of the hospital and clinical services in a better way.	Not supported by any existing system or planned implementation	17
CS3	**Endotracheal Improvement**	Sometimes, re-intubation is required due to incorrect placement of tube. This impacts safety of child, and could happen with frequency as most procedures require sedation and intubation.	Consider "Malpositioned Endotracheal Tube Analyser" which is advanced analytics to prevent avoidable re-intubations.	Not supported by any existing system or planned implementation	27

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Digital Solutions in Accessing Care Pathways

Ref	Project Title	Current state	Action Plan	Supported by EPR or Existing Capability	Priority Score
CP1	Care Pathway Improvement through data analytics	Poor collection of data on outcomes without links to care pathways, and difficult to validate if acuity and scoring have been done properly.	Solution to provide data on adherence to care pathways and as a result promote it.	The Epic implementation may help with this by capturing the relevant data however the information will need to be collected and presented appropriately.	33
CP2	Data Capturing on Care Pathway	Inability to provide pertinent information to patients and parents as they progress through the care pathway.	Solution enabling the capture of all relevant information required and obtained as the patient progresses along the care pathway.	The Epic & Arhidia implementations may help with this by capturing the relevant data however the information will need to be collected and presented appropriately.	32
CP3	Dynamic Optimisation of Appointments	Appointments and diagnostic tests are not necessarily linked to the care pathway and are time consuming to manage especially when there are changes.	Dynamic optimisation of appointments on the care pathways with appropriate alerts and automatic ordering of tests.	The Epic implementation may help with this however the degree of automation implied by the requirement may need an additional capability.	28
CP4	Dynamic & Cognitive Care Plans	Currently, most areas area working in silos. There is a lack of standardization thus lack of standardized clinical care. This can result in less that optimal care for the child, and creates variation in outcomes.	Dynamic and cognitive care plans will help with this. Need to ensure the ability to "re-calibrate" the subsequent steps if a Consultant has the need to work outside of the care pathway (there are always clinical reasons why this would be the case), and have the care-plan re-adjust based on new step in the process (think navigation and TOM TOM)	The Epic implementation will help with this in that GOSH will be able to build care pathways, but will not have the cognitive/dynamic portion	28

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Digital Solutions in Access to Cognitive Decision Support

Ref	Project Title	Current state	Action Plan	Supported by EPR or Existing Capability	Priority Score
CG1	**Cognitive Capabilities and Decision Support**	Overreliance on experience and limited time to process increasing amount of patient data and published evidence	Solutions that reduce the burden on clinicians to keep up with emerging evidence and provide cognitive capabilities and decision support and evidence to support hypotheses. These solutions to act as a 'sieve' and provide doctors with the necessary information to make the right decisions first time and faster.	The Epic implementations will facilitate data recording and storage in a single place allowing information to be recorded in more detail and in the appropriate format. However, Epic will not deal with the increasing amount of information and will not act as the "sieve" required.	27
CG2	**Cognitive Capabilities for Care Pathways**	Difficulty in searching for evidence supporting care pathways	Cognitive solution that gathers evidence to support adherence to care pathways and protocols of care	Not supported by any existing system or planned implementation	14
CG3	**Cognitivie Prediction and Prevention**	There are no flags or indicators to help manage overdue tasks, overdue meds given, overdue reports etc. This concept could be further explored to manage Early Warning Systems in the prevention of conditions like Sepsis.	Cognitive solutions will take the concept of notifications one step further and will help predict and prevent events by providing insight into impact of missed item.	Epic will help with flags and alerts, but will not have the cognitive capabilities that are required to take preventative care one step further.	29
CG4	**Patient Self Scheduling**	Patients are not currently able to self-schedule, check-in, and discharge where appropriate, and the appropriate care for their process step provided to them via mobile. If there are patients/families who are recurrent cancellers, there is no ability to identify this. This has a negative downstream effect on other units and appointments.	Need portals, mobile devices, security to facility scheduling and referrals, and then cognitive to layer on the predictive piece and age-appropriate follow-up required.	Epic will have some elements of this but not all.	26

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Digital Solutions in Access to Patient Data

Ref	Project Title	Current state	Action Plan	Supported by EPR or Existing Capability	Priority Score
CD1	**Smart Integration**	Multiple isolated systems.	Integrated solution that brings all patient data at the fingertips of clinicians e.g. clinical portal that interfaces with the legacy systems or an integrated EPR from a single vendor.	Epic will help by replacing a number of legacy systems with integrated modules, however a number of systems will still remain isolated and an interfacing effort will be needed to tackle that as required.	33
CD2	**Patient Information Digitally Recorded**	Patient data in different silo systems and paper arriving from different sources results in fragmentation of the patient record (Some examples include infection control, bed management, pharmacy, immunology, enzymology, haematology, auto vestibular). General lack of integration leads to work-arounds that can lead to error.	Solution that digitally records all patient information from any channel to the right patient record and assigns actions to the relevant staff members.	Epic will help through the creation of the single patient record and through the workflow but inputs outside of GOSH may not be that straightforward especially when it comes to workflow and they may require an additional capability.	27
CD3	**Dynamic Patient Care Notifications from other NHS Bodies**	Inability to access data held on the patient by the Local Authorities.	Solution that enables digital access to information held by partner organisations such as Local Authorities and includes notifications of changes to the relevant part of the patient record.	Epic may help through the Health Information Exchange though potentially not with the automatic change notifications and thus an additional capability may be required.	26
CD4	**Relevant Patient Information Sharing**	Clinicians spend time providing patient information to other organisations multiple times.	Solution that populates automatically the relevant information requests/needs of other organisations with the clinicians at GOSH entering data only once.	Epic may help through the Health Information Exchange as long as the appropriate electronic forms are configured in the receiving systems.	26

Ref	Project Title	Current state	Action Plan	Supported by EPR or Existing Capability	Priority Score
CD5	Improved Infrastructure	IPP have 85% of their patients coming from abroad. Currently cannot access info from GOSH system in Dubai which poses issues for referral and scheduling. These patients stay longer, and increased LOS is not factored into planning.	Require access to these patients, interfaces for linking data, and cognitive solution that can estimate LOS for better scheduling and management.	Not supported by any existing system or planned implementation	18
CD6	Improved Directory Information	Do not currently have a single source of truth for directory information, there are currently about 15 with data variance.	Required a single source of truth for directory information, so feeds of this data are accurate.	Would need to decide which was the source of truth then set up business rules to make it so. Interface strategy would need to support this end-state.	16
CD7	Clincial Mobile Strategy	Joint consultation/joint collaboration through local teams from other hospitals is currently difficult. Any form of digital communication is lacking and is key to improving communication and accuracy of timely information provided between clinicians, parents, patients, and other organizations.	A robust mobile strategy combined with security to protect patient data is key. Layer in cognitive at this stage to make the mobile solutions more robust.	Epic will help with this, but will not provide the cognitive element	32
CD8	Patient Mobile Strategy	There is a need to implement mobility in a way that clinicians have access on units, in clinics, remotely, and that the patients have the ability to connect with their clinicians using mobile as well.	Cognitive and mobile solutions with security considerations to enhance the delivery of care.	Epic will have some elements of this, but not all. A robust mobile strategy needs to be in place.	35
CD9	Blood Tracking	No ability to do sample tracking from end-to-end. Negatively impacts the child as they may need to have their bloods taken again.	RFID for lab specimens.	Epic will help some what if Point of Care devices are used to print bar-coded labels and then scan lab specimen barcodes, however, it will not track where the specimen physically is in the building so would require RFID tracking	34

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Digital Solutions in Patient & Staff Safety

Ref	Project Title	Current state	Action Plan	Supported by EPR or Existing Capability	Priority Score
QP1	**Cognitive for Reducing Errors**	The true amount of errors is unknown but probability theory suggests preventable errors happen also due to lack of evidence, cognitive biases and lack of sufficient scientific scrutiny.	Solution that provides evidence to the right people, at the right time, in advance of decision-making. For example MDTs to be able to use cognitive technologies to encourage positive discussion of all possible hypotheses, recording differential diagnoses and displaying information on Serious Untoward Incidents (SUIs) in context.	Epic would be the main record for the case reviews. However, all the cognitive aspects of the requirement will be additional.	36

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Digital Solutions in Error Reduction

Ref	Project Title	Current state	Action Plan	Supported by EPR or Existing Capability	Priority Score
QE1	**Automated Flags for Medications / Tests**	There are no automated flags for missed medications or tests, It is all manual	Solution that provides cognitive to enhance the error prevention and alerting system that takes it to the next level of cognitive/digital.	Epic will address the automation of flags. The cognitive aspects will be additional	38

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Digital Solutions in Processes, Outcomes & Predictive Analytics

Ref	Project Title	Current state	Action Plan	Supported by EPR or Existing Capability	Priority Score
QO1	Clear Instructions to support patient tests	For some procedures, blood tests must be at the right level and if a message to the ward has not been actioned properly or was not documented properly, the patient may eat when they are not supposed to resulting in abnormal results.	Need a way to ensure that all staff know the status of what is required pre and post for any test being done.	Epic will help with this	47
QO2	Digital Patient Communication	Digital communication is lacking and will be key to improve communication between clinicians, parents, patients. Email is easy to miss and thus critical messages are being missed.	The Patient Portal integrated as part of the EPR will help with this	The Epic patient portal will help with this.	46
QO3	Non-attendance and cancellation analytics and digital process	There is no system to escalate non-attendance and recurring cancelling patients posing ethical issues if parents are not acting on best interest of their children	Solution to capture non-attendance and cancellations and perform analytics to proactively safeguard patients	Epic may help in capturing information on non-attendance and potentially in the creation of a report enabling analysis, however the analytics provided may be limited and thus may require additional analytics capability.	34
QO4	Patient Remote Monitoring	Nothing available to monitor patients at risk (e.g. epilepsy, medication uptake)	Remote Patient Monitoring solution enabling 2-way information flow	Not supported by any existing system or planned implementation	17
QO5	Enhanced Clinical Coding	Patient acuity scoring is not done properly affecting coding and finance.	Solution and ways of working that enhance the accuracy of clinical coding with the goal of getting to a predictive and preventative model of patient care and delivery.	Epic would make some improvements to clinical coding by capturing the information more accurately. For further improvements including automation additional cognitive capability would be required.	33

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Digital Solutions in Regulatory Reporting

Ref	Project Title	Current state	Action Plan	Supported by EPR or Existing Capability	Priority Score
QR1	**Improved Data Quality**	Poor data quality raises risks to patients from potentially incorrect clinical recommendations based on incorrect data.	Ways to improve the quality of data and the ensuing quality of clinical recommendations reducing errors.	Epic would help with data quality and would have some degree of clinical decision support. This may need further enhancement by cognitive means.	33
QR2	**Process Improvement and Waste Reduction**	Inefficient administrative processes (to access accurate, meaningful data) result in time lost from clinical care.	Ways to improve processes by removing waste and streamlining them, learning from treatment protocols which produced the best outcomes in the most efficient way.	Epic would make a significant impact in process improvement assuming it is implemented with the necessary focus on change management and clinician/user adoption.	46
QR3	**Reporting Capability**	Poor reporting capability resulting from poor data quality.	Ways to improve the quality of data and the ensuing accurate and timely reporting.	Epic would help address both data quality and standard reporting	44
QR4	**Sophisticated Analysis & Reporting on Structured and Un-Structured Data**	Inefficient processes to access meaningful and accurate data results in poor and untimely reporting capability.	Solution that pulls together different types of information (e.g. structured and unstructured) and enables efficient sophisticated analysis and reporting	Epic would make available structured information, however, for sophisticated analysis including unstructured data additional capability will be required.	20

Improve Experience

Digital Solutions to Enhance Patient, Family & Staff Experience

Ref	Project Title	Current state	Action Plan	Supported by EPR or Existing Capability	Priority Score
EE1	Patient Appointment Booking and Smart Support Scheduling	It is very time consuming for parents to book appointments and manage all the changes ensuring that the different departments are notified.	Solution that allows parents to book and manage their children's appointments online and state their requirements (e.g. transport, accommodation) thus triggering interlinked actions to be carried out by the hospital staff which are appropriately amended when things change.	Epic may help through the patient portal, however for interlinked actions an additional capability may be required.	31
EE2	Patient Information and Preferences	Families can find the overall experience of the hospital visit and stay stressful and taxing.	Solution which holds information for families including entertainment and their preferences while they are at hospital.	Not supported by any existing system or planned implementation	17
EE3	Patient Summary for Treating Clinicians	Clinicians can be at a disadvantage when they do not have enough information about the patient to prepare for the appointment and do not know what has been communicated to their families.	Solution to help clinicians understand who the patient is before their appointment and what information has already been shared with the patient and their family.	Epic would help with the patient record being available to the clinician, however additional capability may be required to pull all the necessary information together	34
EE4	Patient Designed Experience	Patients feel uncertainty, fear and anxiety about going to the hospital.	Ways to enable the patient to design their own experience at the hospital incorporating various aspects (e.g. room features and ambience, entertainment, themes) thus reducing their anxiety while their preferences get stored and are available for their next stay.	Not supported by any existing system or planned implementation	17

Ref	Project Title	Current state	Action Plan	Supported by EPR or Existing Capability	Priority Score
EE5	**Patient Personalised Way Finding**	Parents struggle with coming to the hospital, parking and finding their way around.	Solution to enable family to plan their visit ahead by providing information (e.g. site maps, parking) and personalised navigation assistance.	Information could potentially be made available through the Epic patient portal, however additional capability will be required for personalised navigation assistance.	28
EE6	**Parent Information Tracking**	Parents spend time waiting for appointments, trying to find information about their child's care team, about the results of tests and the next steps.	Solution that allows families to follow the patient's treatment including appointments, know the care team members, test results, next steps be able to ask questions to a single point of contact and track status of their query, and be able to send information in multimedia format (e.g. picture, video) to the clinical team.	The Epic patient portal should be able to address this depending on its sophistication. For example tracking status of query and even exchanging multimedia formats maybe require additional capabilities.	28
EE7	**Parent Wellbeing**	There is no focus on ensuring that parents stay strong and healthy throughout the hospital stay which can be stressful and draining.	Ways to improve the wellbeing of parents throughout their visit to the hospital by improving the spaces and helping them take better care of themselves.	Not supported by any existing system or planned implementation	12

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Digital Solutions in Providing Information to Patients & Families

Ref	Project Title	Current state	Action Plan	Supported by EPR or Existing Capability	Priority Score
EI1	Digital Support for venerable patients	Not enough digital support for patients with cognitive and learning disabilities.	Solutions that support patients with disabilities including helping them reduce disorientation when their routine is disturbed.	Not supported by any existing system or planned implementation	13
EI2	Patient Virtual Visit App	Patients feel uncertainty, fear and anxiety about going to the hospital.	Solution via an App that enables the patient to experience the hospital environment and what to expect during their visit through virtual reality tours and through an avatar enable them to ask questions and receive answers appropriate to their age/cognition as well as using gaming for rewarding the patient during their therapy.	Not supported by any existing system or planned implementation	12
EI3	Patient Preference Selection	Patients can resist eating hospital food while not understanding why it is important to eat certain types of food.	Solution that allows the patient and their family to select the patient's food following appropriate diet standards (e.g. for diabetes patient), encourages a healthy lifestyle by reward mechanisms through games and enables patients to provide feedback (e.g. like/dislike) which is learned by the solution to create and propose appealing and appropriate menus.	Not supported by any existing system or planned implementation	11
EI4	Patient Access to Test Results	It is time consuming for patients to call in and find the right person to speak to for their children's diagnostic results.	Solution that gives access to relevant patient information to parents including test results and their expected timing.	The Epic Patient Portal will help address this	46

Ref	Project Title	Current state	Action Plan	Supported by EPR or Existing Capability	Priority Score
EI5	**Patient Experience Journeys**	Parents want to be more knowledgeable about their child's condition and are struggling with answering their child's questions in an appropriate way to help calm anxieties.	Solution to help parents understand the condition of their child and how to talk about it with them through for example experience journals (stories, videos).	Information could potentially be made available through the Epic patient portal. However, for a more intelligent solution, cognitive capability would be required.	22
EI6	**Improved Waiting Areas and Appointment Calling**	Patients and families can spend anxious and long periods of time waiting for appointments.	Provision of better diversions (e.g. entertainment, activities) in waiting rooms and implement a solution that tracks patients in the hospital and informs them and their parents when to return for their appointment providing estimated waiting times.	Not supported by any existing system or planned implementation	14

Digital Solutions in Collaborative Care Plans

Ref	Project Title	Current state	Action Plan	Supported by EPR or Existing Capability	Priority Score
EC1	**Patient Summary for Treating Clinicians (linked to EE3)**	It is time consuming for clinicians to have to sieve through a lot of information before they find the parts of the patient record that are relevant to them.	Solution that provides a tailored summary of the patient record for the different professions and allows the user to personalise it.	Epic may help through the configurable views of the patient record. However, for a summary that includes unstructured information additional capability would be required (e.g. cognitive)	34
EC2	**Patient Experience Lab**	Need to involve patients and families in continuously improving their experience at GOSH.	A creative patient experience "lab" where children and parents share their needs and help design the patient/family experience.	Not supported by any existing system or planned implementation	13

Ref	Project Title	Current state	Action Plan	Supported by EPR or Existing Capability	Priority Score
EC3	**Full Patient Record View**	Lack of comprehensive view on patients with complex needs seen by multiple teams resulting in poor staff experience and potential negative impact on patient care.	Solution that captures and makes available to all clinicians the full patient record.	Epic would help with this by making the complete record available to all clinicians. Although it will probably have a summary screen, more sophisticated summaries including unstructured data will require cognitive capability.	33
EC4	**Hospital Concierge**	No single place to find all the required information about the hospital.	Solution like an "inpatient or outpatient concierge" that provides all necessary information to patients and families about the hospital services.	The Epic Patient Portal may address this by making available information. However, the concept of the concierge is additional capability.	24
EC5	**Online Clinical Consultations**	Electronic consultations via Skype are used only by a minority of clinicians and they do not function properly on a consistent basis.	Solution that enables all clinicians to have electronic consultations of high technical quality with parents, referring hospitals and other organisations.	Virtual Consultation Room solution already implemented	46

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Digital Solutions in Returning the Patient to Normal Life

Ref	Project Title	Current state	Action Plan	Supported by EPR or Existing Capability	Priority Score
EL1	Patient Interaction	Patients and their families can feel isolated and need to interact in a way of their choosing.	Solution to enable families to connect with support groups and other families and coordinate to meet and interact in the way that suits them best.	Skype and WebEx functionality already installed. Additional Configuration may be required	37
EL2	Digital Food Ordering	Long queues at the canteen result in parents staying long periods away from their children.	Parents to pre-order food from the canteen and know when it is ready for collection to avoid long queues.	Not supported by any existing system or planned implementation	11
EL3	Improved Clinical Collaboration	Physical constraints (e.g. colocation) restrict the effectiveness of collaboration between clinicians in and out of GOSH.	Enable clinicians to collaborate without the need to collocate (incl. in MDTs and globally) through joint access of patient records, virtual conferencing and cognitive whiteboards.	Epic could make the patient records available to GOSH clinicians and potentially share them with other organisations too. However, enhanced collaboration tools and the cognitive aspects need additional capability.	31
EL4	Improved Parent Accommodation	Limited parent accommodation in the hospital affects ability of family to stay together.	Ways to improve off-site accommodation and digital bookings for when families need to stay over in London.	Not supported by any existing system or planned implementation	13
EL5	Keeping Patients in-touch with everyday life	Patients can lose touch with school and friends and feel isolated then struggle to return to their life outside the hospital.	Solution to enable patients to stay in touch with school, teachers, class mates and friends and exchange information (e.g. schoolwork).	The Epic patient portal could potentially help but that will be limited. Potential to utilise existing Skype or WebEx Solutions.	27
EL6	Recreating Non-Hospital Environments	Patients can feel alienated from the hospital and want to go home.	Ways of recreating non-hospital environments (e.g. school) to enable patients to feel closer to their life outside the hospital during their stay.	Not supported by any existing system or planned implementation	12

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Improve Interactions

Digital Solutions in Patient Administrative Services & Interaction

Ref	Project Title	Current state	Action Plan	Supported by EPR or Existing Capability	Priority Score
IP1	**Dynamic Scheduling**	Scheduling complexities and inefficiencies in every area (inpatients, outpatients, theatres) especially when appointments need to be rebooked.	Solution that enables efficient and dynamic scheduling across the hospital	Epic would contribute in scheduling clinic appointments and theatres. Dynamic, real time scheduling with predictive aspects may well require additional capability.	31
IP2	**Digital Referrals**	Massive process inefficiencies because of the referral process and how it links up with scheduling of appointments.	Solution that enables a smooth referral and scheduling process.	Epic would contribute to referral (through the Health Information Exchange) and scheduling. For extra sophistication, additional capability would be required.	30
IP3	**Improved Communications**	Need for improved communications between clinicians, patients, parents (e.g. the use of e-mail is an improvement but messages can be missed in a long list of e-mails).	Solution that incorporates elements of Facebook to compartmentalise communications in interest groups or other entities (e.g. clinical pathway).	Potential to use existing communication tools, e.g. Facebook, but may require additional functionality to realise full benefits	30
IP4	**Personalised Patient Admin**	Inconsistent and reactive administrative services and interaction with patients and their families.	Personalised admin and interaction before, during and after the hospital visit.	Epic may help by providing relevant information on the patient. Personalised interaction will depend on the ways of working instigated with the EPR and may require additional capability.	30
IP5	**Digital Sample Labelling**	Manual sample registration that can result in transcription errors and repeat intervention (e.g. child to be bled again).	Solution to register and label samples digitally.	Epic would help address this	45

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Digital Solutions in Access to Patient Data and Devices

Ref	Project Title	Current state	Action Plan	Supported by EPR or Existing Capability	Priority Score
IA1	**Real Time Communication of Patient Information from other Hospitals / GP's**	Information from other hospitals or diagnostic centres is not real time.	Solution that enables the real time communication of information from other organisations.	Epic may help through the Health Information Exchange but appropriate arrangements will need to be made to agree the format and content of the information transfers.	27
IA2	**Real Time Communication of Patient Information for Parents**	Parents are relied on for carrying and presenting some of the patient care information to their local hospitals and GPs.	Solution that enables information exchange between GOSH and referring clinicians at other hospitals and GPs.	The Epic patient portal will help with this and the exchange between other hospitals and GP's will be picked up by project IA1.	39
IA3	**Mobile Strategy**	Mobility is either patchy or non-existent resulting in inefficient processes and low staff satisfaction.	Mobile strategy that promotes use of mobile devices and solutions configured to be accessed by mobile	Epic would be available on mobile and designed as such, however a mobility strategy will need to be in place prior to its implementation.	44
IA4	**Integrated Recording of Interventions**	Lack of appropriate technology in operating room (e.g. interventional radiology) leads to process inefficiencies.	Integrated solution enabling efficient recording of interventions (e.g. dictation).	Epic may help address this for example by the incorporation of dictation capabilities as long as these are within its scope.	31
IA5	**Reduction in Ad-hoc systems**	Ad hoc systems driven by clinicians; not necessarily secure or universally used by all.	System for sharing information in real time, including medical notes, imaging and expertise.	Epic may help with this but it is only the technology aspect of a significant requirement in culture change that best be tackled prior to its implementation.	38

Ref	Project Title	Current state	Action Plan	Supported by EPR or Existing Capability	Priority Score
IA6	**Remote Patient Monitoring and Wearables**	Very little in the way of telehealth, only ECG box delivered back by the patient at next visit.	Telehealth solution like Remote Patient Monitoring enabling the gathering and exchange of multimedia data (e.g. video) between patient and family and clinicians.	Not supported by any existing system or planned implementation	18

Digital Solutions in Decision Making Data

Ref	Project Title	Current state	Action Plan	Supported by EPR or Existing Capability	Priority Score
ID1	**Demand and Supply Management for IPP**	Need for improved capacity and demand management in IPP.	Solution to enable sophisticated demand & supply management.	Epic may help with this depending on its analytics capability. Predictive analytics will probably require more sophisticated capability.	31
ID2	**Referral Tracking**	Inability to track activity and from where referrals originate in order to effect improvements in operations.	Solution that tracks referrals and resulting activity leading to insights and improvements.	Epic would help track referrals as long as the appropriate analysis and reporting is carried out.	43

Ref	Project Title	Current state	Action Plan	Supported by EPR or Existing Capability	Priority Score
ID3	Integrated Relevant Patient Information View	Inconsistent availability of data. Some of the data is available, some of the time, on some workstations. Numerous databases and multiple clinical systems contain bits of useful data to create the full picture of patient record, research data, clinical trials and scientific evidence. MDTs largely based on information shared by clinicians in real time.	An integrated view of relevant data, accessible securely by the right people at the right time. Information on Serious Untoward Incidents (SUIs) accessible in the context of active considerations for treatment. Preparation of evidence for patient cases at MDTs prior to meetings. Latest scientific evidence curated by GOSH including its own research to be considered before any decision is made.	Epic will enable collection of patient data in one place. However this requirement requires additional capability for example focussed on MDTs and for all cognitive aspects around research.	28
ID4	Comprehensive Results View	Inability to have a holistic view of results (e.g. immunology, enzymology, haematology) due to lack of integration of separate solutions.	Comprehensive integrated solution including all lab results.	The Epic Lab module will help with this and it should be possible to create the required presentation of information including visual.	46

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Digital Solutions in Internal Interactions

Ref	Project Title	Current state	Action Plan	Supported by EPR or Existing Capability	Priority Score
II1	Digital Discharge Summaries	Discharge summaries are laborious and time consuming to produce.	Solution that assembles rapidly the correct information for the creation of discharge summaries and other reports.	Epic would help with this by creating the discharge summary as the care progresses. For inclusion of analysis of unstructured data a cognitive capability would be required.	35

Ref	Project Title	Current state	Action Plan	Supported by EPR or Existing Capability	Priority Score
II2	Quick Digital Recording of Height & Weight	Taking height and weight measurements takes time from the appointment and causes delays that impact the operation of outpatient clinics.	Solution that minimises the time taken for basic measurements (e.g. height, weight).	Not supported by any existing system or planned implementation	12
II3	Performance Benchmarking and Decision Making	Inadequate provision and usage of management information (e.g. on performance of a clinical team).	Business Intelligence solution providing analytics for benchmarking performance and decision making	Epic would help to some extent by providing the information on performance of clinical teams, however benchmarking will require additional inputs.	31
II4	Specimen Tracking	Inability to track specimens (e.g. blood sample) end-to-end can result in repeat intervention (e.g. child to be bled again).	Solution to track specimens end-to-end.	Epic would help address this though some additional capability to portray the real time tracking may be required.	33
II5	Smart Results Checker	Manual authorisation of lab results is inefficient, laborious and error prone.	Solution to automatically perform delta checks (with previous results) and range checks to lab results resulting in increased accuracy and efficiency.	Epic would help address this through its analytics on lab results/. More sophisticated analysis may require additional analytics capability and workflow.	34
II6	Standardised Processes	Lots of workarounds and variations in care (e.g. even NICU, PICU and Cardiac ICU all have different practices) increase risk of patient harm.	Solution to help standardise processes.	Epic will help standardise but it is only the technology aspect of a significant requirement in culture change that best be tackled prior to its implementation	38
II7	Improved Communications for Care Interventions and Diagnostics	Ineffective communication between departments (e.g. lab to ward regarding fasting prior to blood test) can impact patients.	Solution to enhance communications around care interventions and diagnostics.	Epic would help with this but it is only the technology aspect of a significant requirement in culture change that best be tackled prior to its implementation.	35

Ref	Project Title	Current state	Action Plan	Supported by EPR or Existing Capability	Priority Score
II8	**Patient Tracking**	Inability to know where the patient is in the hospital.	Solution that tracks patient arrival and movement throughout the hospital and informs relevant clinicians of their presence.	RFID Tracking could help with this but will require tags to be integrated into wristbands	31

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Improve Research & Innovation

Digital Solutions to Facilitate Research

Ref	Project Title	Current state	Action Plan	Supported by EPR or Existing Capability	Priority Score
RF1	**Coding for Research**	Inability to utilise easily patient data for research	Solution that allows the coding of patients for research purposes	The implementation of the Aridhia Research Platform will address this	45
RF2	**Collaboration and Sharing of Outcomes**	Lack of available technology also affects ability to partner hospitals (e.g. for Clinical Genetics) and limits their ability to expand their capabilities.	Solution that enables collaboration, sharing outcomes and best practice.	The Aridhia implementation will help with some but not all of this.	32
RF3	**Improved Data Storage and analytics**	Currently there is not a single platform for data storage, handling, curation and analysis.	Future should allow for storage, handling, curation, analysis that leads to predictive and preventive medicine, including appropriate governance and deidentification.	Epic, Aridhia and VNA implementations will address this	43

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Digital Solutions to Integrate Research into Clinical Care

Ref	Project Title	Current state	Action Plan	Supported by EPR or Existing Capability	Priority Score
RI1	**Cognitive Awareness and Prediction**	Large % of patients have learning disabilities - how can digital help with children of different cognitive abilities (play, school)	Future should allow for awareness of cognitive abilities of children, and be able to predict what info they need to suit their abilities.	Not supported by any existing system or planned implementation	15

Ref	Project Title	Current state	Action Plan	Supported by EPR or Existing Capability	Priority Score
RI2	**Clinical Care Enhanced by Research**	Somewhat distinct with secondary use of data performed by researchers in silos.	Every element of clinical care will be enhanced by research. This information will become visible to doctors when considering treatment options, searching for clinical trials and planning research studies.	The Aridhia implementation may help with this, however there is a culture change aspect that needs to be addressed as well as the cognitive element of bringing all the information together and the related clinical decision support.	34

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Digital Solutions to Accelerate Pioneering & Breakthroughs

Ref	Project Title	Current state	Action Plan	Supported by EPR or Existing Capability	Priority Score
RP1	**Smarter Research and Publication**	Research of new treatments based on intuition and observation.	Research based on probabilistic targets, leveraging evidence from past GOSH research and universally published literature. Much more targeted identification of correlations that have a high likelihood of success, repurposing of past research and faster route to publications.	The Aridhia implementation will help with an element of this, but additional cognitive solution will also be required	37
RP2	**Analytic Capabilities for Preventative and Predictive Care**	There is a need to have a view of the overall performance of the health team, collate information and then benchmark it.	Need analytic capabilities that can draw conclusions from data and provide options to get to preventative and predictive care.	The Aridhia implementation may help with an element of this, but additional cognitive solution will also be required	29

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Digital Solutions to Educate

Ref	Project Title	Current state	Action Plan	Supported by EPR or Existing Capability	Priority Score
RE1	**Access to Latest Educational Material**	Accessing educational material (e.g. online journals) is challenging with not enough underlying infrastructure	Properly supported educational solution enabling access to the latest educational material	Access to Eduroam will help address this	35
RE2	**Apps to Support Patients Digital Preferences**	Education does not follow the digital preferences of the younger generation	Social media used to promote education and Apps to sign-post what material is available and to provide feedback	Not supported by any existing system or planned implementation	13
RE3	**Cognitive Learning & Education**	Education on one-to-one basis. Knowledge is passed down from Professor to trainee, then begins again from lowest level. No legacy of knowledge built up over years of tenure of experts.	Solution that allows cognitive system to learn from experts and continue educating trainees based on increasing knowledge. Doctors to begin their speciality training from position of state-of-the-art medical knowledge and expand from there. Will also lead to the "democratisation" of expert knowledge.	Potentially the Aridhia implementation may help with some of this if it integrates Imaging and clinical notes. However, all the cognitive aspects require additional capability as well as strong culture change.	30
RE4	**Patients Understanding and adherence to clinical instruction**	Patients and families face difficulties understanding and adhering to clinicians' instructions and staying engaged with the clinical process between visits, when preparing for admission or when recovering at home post-discharge.	Solution that enables the patient and family to follow the care plan and complex instructions (e.g. multiple medications) to ensure they do receive the required quality of care.	The Epic Patient Portal can be used to address this	45
RE5	**Patients Understanding and adherence to clinical instruction**	Lack of technology to help patients and parents understand procedures means that anxiety levels are higher than they need to be, which contributes to a poor patient and parent experience. Different language requirements for this patient information.	Solution that enables the patient and family to follow the care plan and complex instructions (e.g. multiple medications) to ensure they do receive the required quality of care.	The Epic Patient Portal can be used to address this	45

Ref	Project Title	Current state	Action Plan	Supported by EPR or Existing Capability	Priority Score
RE6	**Age-appropriate information for patients**	At the moment, education material is provided to child and parent but it isn't always possible to have the most relevant information provided to the child based on their level of understanding and age.	Future state will have age-appropriate information being sent to patients and families, that is aware of the type of education and media that education requires based on patient's age and abilities.	The Epic Patient Portal will help deliver the material but additional capability will be required to produce the digital age-appropriate information	31

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4.1.3 Digital Timeline

The essence of the Digital Roadmap is the creation of a timeline of the projects identified in order to achieve the Digital Initiatives over a 3 to 5 year timescale.

The Epic and Aridhia implementations will form a central aspect of the timeline.

This portfolio of work will be overseen by the Digital Steering Committee to ensure it is delivered as a coherent programme and that new technologies and innovations are constantly being reviewed.
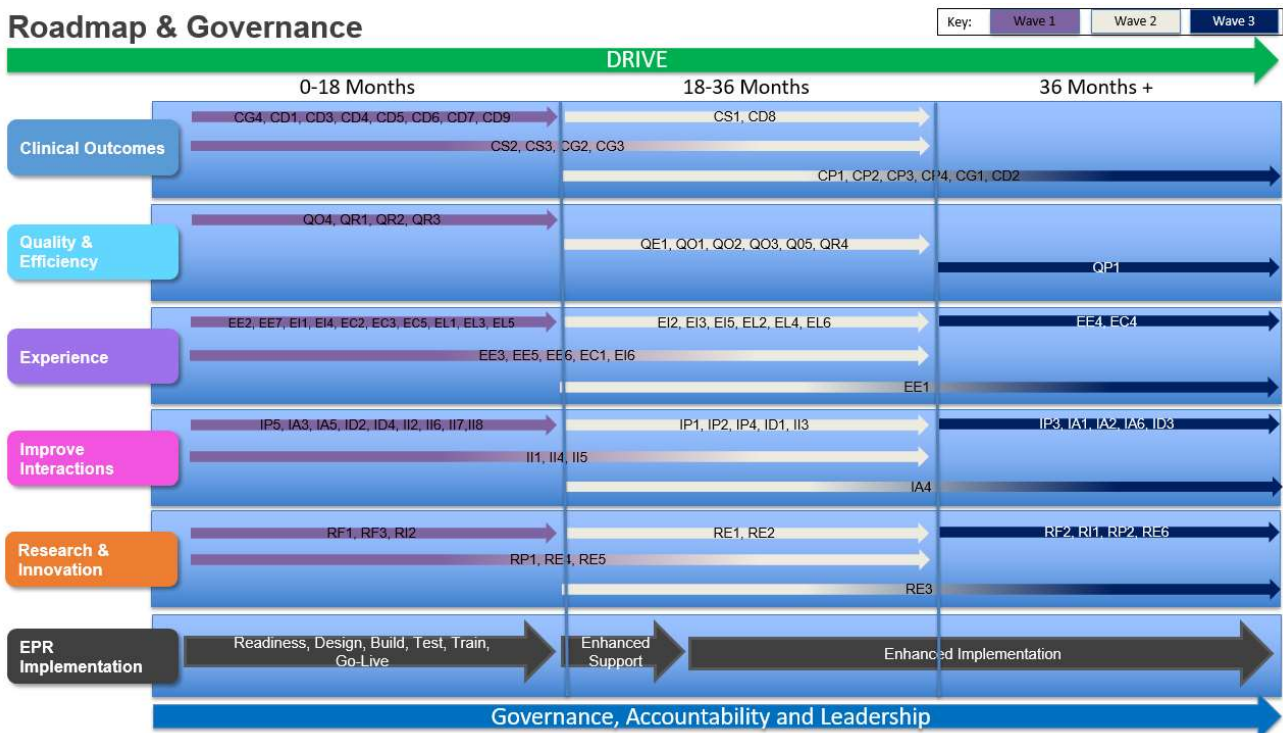
4.2 Digital Principles

To ensure a consistent approach to all of our digital initiatives it is imperative that we are guided by a set of core principals when implementing digital. These must support our digital vision and all our digital services must be so simple to use, convenient and compelling, that those who can will choose to use them

Principal	Description
Choice	We will not force our patients to use digital channels; they will be attracted through simplicity and convenience. We will, however, increasingly assume that our NHS partners will want to, and will use digital channels for their interactions with the Trust.
Access to Services	We will design services with digital in mind, mobile increasingly as the default, and work hard to ensure that our services are accessible to all and assume demand will increase over time.
Improve Quality	We will improve the quality of our services by reducing process times, improving efficiencies and providing transparency in what we do.
Value	Significant cost savings can be achieved in transactional areas, and efficiency gains achieved in front line areas and should result in better value for money.
Fully Automate	The roadmap will be most effective where the whole patient journey, not just part of it, is using digital to automate. The roadmap seeks to achieve much more than putting forms online whilst requiring staff to manually process.
Controlled by the Patient	Digital services increasingly allow the patient to see what is happening, and determine the next steps helping to collaborate with GOSH to get the best clinical outcomes.
Simple	The roadmap requires that we work with our patients to simplify services and processes, using technology to break down barriers and obstacles and 're-imagine' the service to fully use digital opportunities
Convenient	Our patients increasingly demand access anywhere, anytime and digital services to support this – convenient to our patients, not just to GOSH
Compelling	We will design simply, with the patient in mind, the benefits of using digital services should drive further adoption without the need to mandate use.
Considerate	We will consider all aspects of society and the Digital Roadmap includes initiatives to support digital inclusion. We must also recognise that there will always be patients who cannot fully use digital services and for these, the digital roadmap will support other channels available.

4.3 GOSH as a Digital Hospital

Once the Roadmap Aims and Objectives have been achieved, the digital experience at GOSH will begin before the patient even arrives at the hospital. The sleek processes will guide the patient through their journey, will enable the clinical teams to achieve the best possible outcomes and provide positive experiences for our patients, their families, our staff and our other stakeholders.

It is difficult to imagine, given where we are starting from, just how the hospital will look once the roadmap has been delivered, we have therefore detailed the following processes that provide an insight to what GOSH will look like as one of the most advanced digital hospitals globally. It is made up of eight core processes, as follows:

1. Registration
2. Admission
3. Orders
4. Procedure
5. Inpatient Care
6. Discharge
7. Post discharge/Self-care/Virtual Follow-up
8. Remote monitoring and Outpatient Visits

Registration

Digital solutions that support the Registration process reduce anxiety, provide remote monitoring capabilities, education, and use cognitive to predict LOS based on current evidenced-based data
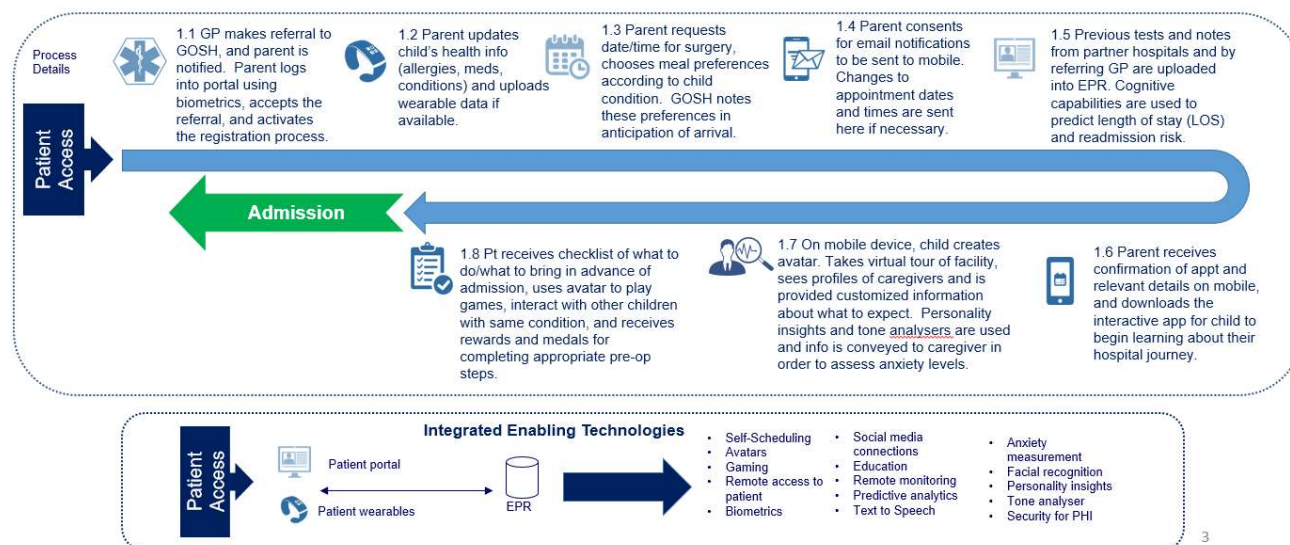
Admission

Digital solutions for Admission streamlines the process, aids in patient flow management based on risk predictors, and reduces anxiety by orienting the patient and family into a comfortable, familiar environment

PROCESS 2: ADMISSION

Process Details

2.1 Hospital App guides patients with transport options and exact hospital entrance and estimated walking time from public transport and within hospital.

2.2 Greeter meets parent and child at registration desk. (Consider robotic concierge). Parents can access information about services, visiting hours, doctors, etc.

2.3 Patient record created and demographic information is updated. Information about child's room and controls are updated on the patient app.

2.4 Visit is generated using Registration Checklist, and patient tracking device is provided.

Patient Information

Manage Orders

2.7 Nursing staff greet child and parents, document vitals signs, initiates med rec, documents ht/wt and makes clinical notes using speech to text that automatically populates the EPR. Child gets oriented to ward using augmented reality app that includes trivia and a treasure hunt. Child connected to friends via secure portal.

2.6 Ward is notified, and staffing assignment completed. Upcoming tasks show on Nursing worklist. Care coordinator or robotic concierge escorts child to SmartRoom on ward. Parent and child can turn on lights in room, play music, change room temp either by mobile app or voice recognition. Parents have access to video connections with child in room.

2.5 Bed assignment is created, and Digital visual board is updated. (contains data feeds for scheduling, prediction, simulation, and visualization for all admin and clinical staff including surgeons).

Integrated Enabling Technologies

Patient Information

Mobile technology ⟷ EPR ➡

- GPS/Navigation
- Robotics concierge
- RFID
- Digital board
- Augmented reality
- Mobile
- Portal

- SmartRoom - Voice recognition for room control
- Predictive analytics for LOS prediction
- Gaming
- Remote monitoring

- Biometrics for staff Security
- Staff updates info anywhere with scan/badge
- Mood/anxiety monitoring

4

Orders

Digital capabilities help manage orders by predicting/preventing adverse events, and by ensuring that any orders being placed align with leading best practices to optimize the delivery of safe and effective care

PROCESS 3: ORDERS

Process Details

3.1 Physician logs onto Inpatient EPR using single sign on/biometrics and reviews patient dashboard (lab tests, current meds) from previous visits and other organisations. Looks at graphed view to see trends.

3.2 An alert is displayed that shows patient as high risk for increased length of stay and readmission based on the fact that she has a significant infection and is a diabetic, and lives 3 hours outside of London.

3.3 Anticipated LOS displays on digital board, and Discharge Manager is notified to start the discharge planning process.

3.4 Pre-op order sets suggested, and provider reviews, selects order using speech to text, modifies as necessary. Information is sent to parent and child about upcoming procedure and related medications and side effects.

Patient Care

Procedure

3.9.2.1 e-Consent is obtained by parent for child's upcoming procedure

3.9.1 Child is prepped for procedure, and notifications are sent to the theatre. Parent initiates relaxing music and lighting for child in room. Staff know where child is prior to surgery due to RFID.

3.9 Parent is notified that child can maintain activity as tolerated until theatre, and child goes on app to learn about upcoming surgery and post-op care and interact with other children who have had the same procedure.

3.8 Nursing orders populate Nursing task list based on shift assignment and care pathways for treatment display.

3.7 Dietary orders routed to Dietary system. Flag appears for Nurse that child is Nil By Mouth starting at midnight.

3.6 Lab orders sent to Lab System, and phlebotomist notified

3.5 Medication orders sent to Pharmacy.

Integrated Enabling Technologies

Patient Care

Portal ⟷ EPR ➡

- RFID
- Digital board
- Augmented reality
- Mobile
- Single sign-on
- Speech to text

- SmartRoom - Voice recognition for room control
- Predictive analytics for LOS
- Inventory management

- Security
- Biometrics
- Staffing predictions

5

Procedure

Digital solutions during Procedures help manage patient flow, predict LOS, and prevent scheduling issues that would otherwise be a source of frustration, anxiety and discontent for children, parents, and staff

PROCESS 4: PROCEDURE

Process Details

Patient Information

4.1 Digital board displays theatres in progress, and upcoming theatres for the day for all theatre staff. Any issues related to pre-op care are flagged.

4.2 Child arrives to pre-op area and is greeted by theatre Nurse. The child is familiar with the staff from the virtual reality tour she received. RFID confirms child upon arrival.

4.3 SmartRoom is automatically adjusted to the appropriate temperature for the upcoming procedure, and required equipment is easily located using RFID.

4.4 Anesthetic successfully administered. Child is intubated, and device data from tube is quickly read and confirms that tube is correctly placed. Child completes procedure and is transferred to Recovery Room to stabilize. Digital boards are updated with patient location, and Nursing ward is notified of anticipated time of arrival from Recovery.

Inpatient Care

4.8 Digital board is updated with changes, and all affected areas are notified of changes. Staffing adjusted as appropriate. In the meantime, patient status is also communicated to parents via mobile.

4.7 Theatre schedule must be adjusted based on extra cases. Analytics used to suggest potential upcoming cancellations based on patient condition, anticipated LOS, staffing requirements, and location of patient. Analytics used to recommend which inpatient patients could be candidates for early discharge based on status, with support via remote monitoring and virtual Outpatient Clinics.

4.6 Room selected using bed management system. Equipment cleaned and located using RFID. Analytics used to examine which beds will be appropriate for the isolation requirements and staffing needs of the patient. Notifications sent to Inpatient Managers.

4.5 Mid-day, two unplanned emergencies arrive that need immediate attention. One requires an isolated room (e.g: VRE positive). The Digital board display this information, and bed managers are notified.

Integrated Enabling Technologies

Patient Information → Device integration ↔ EPR →
- Cognitive technology
- Predictive analytics
- Mobile
- RFID
- Smartroom – temperature control

6

Inpatient Care

Digital capabilities for Inpatient care ensures appropriate care pathways are being followed, enables the integration of devices, accurate inventory management, and promotes excellent day-to-day care

PROCESS 5: INPATIENT CARE

Process Details

Patient Care

5.1 Patient returns to ward post-procedure and returns to SmartRoom. SmartBed automatically records weight and vitals, and send to integrated chart, and Nursing staff is notified of arrival.

5.2 Nurse assesses child, and reviews recommended care pathways and tasks lists for line of treatment for child. Post-procedure assessment is documented in electronic chart.

5.3 Parents facetimes child from work, and is able to have live discussion with Dr.post-op and receives a summary of the procedure.

5.4 Child verbalizes pain, so Nurse conducts pain scale and documents levels in chart. Nurse then checks eMAR and sees that PRN pain medication can be administered.

Discharge

5.9 Age-appropriate discharge teaching commence, and appropriate information is loaded onto child and parent app. This information will change with the progression of time, and provides more age-appropriate info for the child as they mature

5.8 Parent is notified that child can now commence normal activity as tolerated, and that discharge will take place as planned. Digital board is updated with upcoming discharge status. Discharge checklist activated.

5.7 Nursing orders populate Nursing task list based on shift assignment and care pathways for treatment display.

5.6 Nurse scans bar-coded medication, to confirm the 5 rights, then scans patient wristband to confirm patient. Medication is then safely administered and documented

5.5 Nurse retrieves med from automated dispensing cabinet and pharmacy is notified of low stock.

Integrated Enabling Technologies

Patient Care → Device integration ↔ EPR →
- RFID
- Digital board
- Augmented reality
- Mobile
- Single sign-on
- Speech to text
- SmartRoom - Voice recognition for room control
- Predictive analytics for LOS prediction
- Gaming
- Security
- Biometrics

7

Discharge

Digital solutions are key for managing discharge, LOS, preventing avoidable readmissions, and reducing patient/family anxiety levels

PROCESS 6: DISCHARGE

Process Details

6.1 Discharge planning initiated upon admission based on appropriate care pathway: Dr. determines discharge criteria and anticipated DC date. Digital boards are updated, and families are made aware.

6.2 Barriers to discharged (eg: social work not available, receiving hospital refuses to accept patient on scheduled date) are flagged on the discharge checklist and alert sent to staff caring for child. Appropriate interventions are put into place and monitored to ensure safe discharge.

6.3 Decision made to discharge (Dr. writes DC orders in Inpatient system, uses voice recognition to dictate discharge summary note. Consultant writes consult orders to specialists, OT, PT, and SW as required, and they are flagged that an assessment is due.

Post-Discharge

6.6 Patient discharged (Patient receives discharge instructions to mobile device, porter or robotics concierge notified to help transport patient to front door, clerk discharges patient from Inpatient system). Patient's wearables are configured to hospital system for remote monitoring, and virtual clinic appointment is set up via patients self-scheduling. Location-appropriate resources and services are flagged for the family.

6.5 Mobile teaching app loads that continues care pathways and home monitoring system for patient at home, and connects child to other children who are experiencing the same recovery.

6.4 GP is notified of medication changes, Discharge prescriptions sent to Outpatient Pharmacy, Nursing is notified to prepare discharge package. Mobile teaching app loads that continues care pathways and home monitoring system for patient at home, and connects child to other children who are experiencing the same recovery.

Integrated Enabling Technologies

Patient portal

Patient wearables

EPR

- Remote monitoring
- Wearables
- Cognitive technology
- Predictive analytics
- Mobile
- Self-scheduling
- Automated notices
- Robotics/concierge
- Education
- Virtual clinics

8

Post-Discharge/Self-Care/Virtual Follow-Up

Digital solutions help children and families get home sooner and safer, prevent avoidable readmissions, and reduce patient/family anxiety levels

PROCESS 7: POST-DISCHARGE/SELF-CARE/VIRTUAL FOLLOW-UP

Process Details

7.1 Parent is sent a reminder notification to select a follow-up appointment in the virtual Outpatient Care Centre.

7.2 Patient is sent daily reminders of post-op exercises to follow, which is linked to patient fitness tracker/wearable. Child uses voice to text to record diary, and pictures to record pain and discomfort levels.

7.3 Fitness logs are tracked on wearable, and diary logs are uploaded so GOSH staff can remotely monitor child's anxiety levels.

7.4 Medications are logged, and notifications are sent to GOSH chart and GP.

Remote Monitoring

7.8 Continuous, age-appropriate education is provided to parent and child as child grows and matures over the years, with a grading component of information provided to the patient. Ongoing monitoring takes place.

7.7 Family is sent satisfaction survey on overall experience, and rates care given and ease of navigation at facility that is benchmarked against similar facilities.

7.6 Family-scheduled virtual Outpatient clinic visits are used to monitor patient recovery, and allow them to get home sooner and safer and recover in a familiar environment, while still having access to clinical care.

7.5 Family is connected to family/patient support groups on social media.

Integrated Enabling Technologies

Patient wearables

EPR

- Remote monitoring
- Wearables
- Cognitive technology
- Predictive analytics
- Mobile
- Voice to text
- Telemedicine
- Self-scheduling
- Automated notices
- Education
- Virtual clinics
- Gaming
- Security

9

Remote Monitoring and Outpatient Visits

In addition to the defined processes experience journeys have been created so that patients and staff can obtain an understanding of what a Digitally mature GOSH will look like from their perspectives. These can found under Appendix B.

Following the implementation of the Digital Roadmap, it is envisaged that GOSH will increase significantly in digital maturity from a low stage three to stage seven:
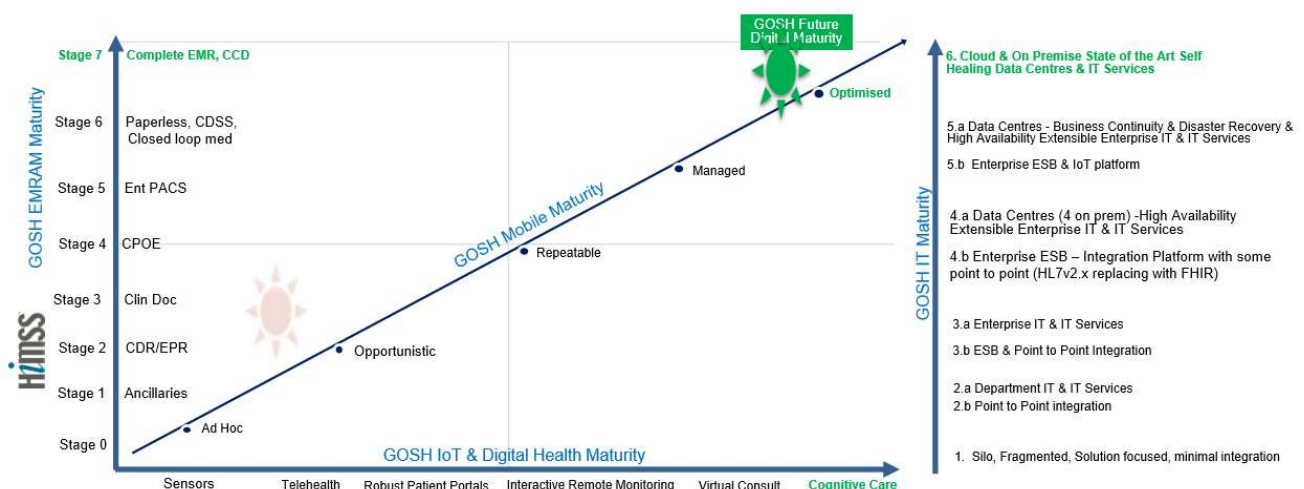
4.4 Leadership, Commitment & Governance

ABOUT

Digital transformation can provide significant benefits to our patients, families, staff and other stakeholders.

One area of GOSH cannot deliver digital alone. We need everyone to see opportunities to improve services, continually improve and adapt the way we work.

Every area of GOSH will engage and work with our patients. We need to ensure the whole organisation understands the benefits of the journey we are undertaking.

···

AIMS

To ensure strategic prioritisation and commitment to change and to pursue the opportunities presented by the Digital Roadmap

By

Ensuring our leaders from Executives down collectively own the delivery of the components and direct staff at all levels of work together towards achieving the aims of the Digital Roadmap.

ACTIONS

Governance Board	Chief Officer Responsibility & training	Department Ownership & Champions
Digital Steering Group to be re-instated, chaired by CEO	Chief Offices Group (CIO / CCIO / CRIO) accountable for Digital Roadmap delivery	Digital Agenda added to every Dept. Senior Leadership Meeting with champion roles to co-ordinate at dept. and div. level

4.5 Capacity & Capability

ABOUT

The pace of digital innovation is constantly increasing and GOSH has limited resources to investigate and deliver high quality change and sustain it into the future.

We must ensure that we have a forum across the organisation who can think digitally and collaborate with our patients and partners to identify, design and deliver a new range of digital services to support our clinical practices

……………………………………

AIMS

We will increase the pace of change across the organisation in pursuit of benefits

By

Increasing the digital capability and skills of staff within GOSH, collaborating with patient and suppliers and keeping our focus against a clearly defined set of priorities

ACTIONS

Create 'DRIVE'	Courses for "Digital Skills"	Rapid Deployment
Establish an Innovation Group (Digital Research & Innovation Environment) - DRIVE	Establish a range of programmes for staff across the organisation on new "Digital Skills"	Investigate improved sourcing methods with local partners for rapid deployment

4.6 Adoption & Inclusion

ABOUT

The impact of new digital technology is all encompassing and offers many opportunities for improvements. However, we must make sure that the pace of change does not leave anyone behind.

GOSH will benefit from these opportunities through delivering simple and convenient digital services to those who choose to use them and ensure this is conducted in a safe and responsible way.

………………………………………..

AIMS

To inspire rather than mandate our patients to use digital services and to work with our partners to ensure digital services are as effective as possible

By

Ensuring that they are simple, convenient and compelling. We must minimise digital exclusion and maintain safety and confidence to maximise the benefits digital provides.

ACTIONS

Promotion	Create 'DRIVE'	Cyber Security
Deliver more services digitally and promote services available across all channels	Establish an Innovation Group that will consider, monitor and promote initiatives that increase digital adoption & inclusion	Ensure the objectives of the Cyber Security Strategy are delivered in order to strengthen our Information Security

4.7 Design Digitally

ABOUT

Digital services give us an opportunity to challenge historic ways of working and reimagine patient care and service delivery in a digital world. An environment where patients are in control of their information and can choose how it shared to access services.

Digital services are not bound by the limitations of paper and can provide a simpler, more personalised experience for customers, faster processing and deliver much more effective information for future decision making

We need to challenge at every opportunity the current processes and ensure they are improved before they are digitised and built around the customer needs.

………………………………..

AIMS

To ensure we fully benefit from digital services, the potential they offer and not simply digitise inefficient processes.

By

Challenging existing processes and where possible simplifying them to support patient care. We must streamline how the service will be presented to customers and fit this into more efficient internal systems.

	ACTIONS	
Simplify before digitise	**Maximise key systems**	**Multi-disciplinary development**
Use the DRIVE initiative and Digital Champions to investigate all services and ensure we make them as simple as possible before considering digitisation	Actively work with suppliers of systems to understand their roadmaps and ensure that we are able to utilise the full capability of their systems	All digital services to be developed with a combination of clinical knowledge, patient knowledge and technology knowledge

4.8 Common Foundations

ABOUT

By redesigning services around our patients and reimagining how services could be delivered in a digital world, we will be able to greatly reduce the cost of systems and simplify processes for ourselves and our customers.

This means we need to develop a simple yet powerful set of core components that can support this approach and be reused time and time again.

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AIMS

To reduce the cost and speed of developing integrated digital services

By

Developing digital foundations that allow us to quickly develop new solutions, reusing functionality wherever possible and supporting both online and offline channels. To continually develop over time, we must resist short term solutions that only solve specific problems and where possible we need to stop user older bespoke systems.

ACTIONS

Common Components	Digitise internal workings	Embrace new services
Implement improved foundations in on-boarding staff and patient self-registration.	Relentlessly seek to digitise and remove paper from inside the organisation	Define and publish strategies to embrace services such as "Cloud" technology and use them where possible to maximise the full potential of digital services

4.9 Measure & Evaluate

ABOUT

The simplification of services by moving to digital information presents great opportunities to deliver better clinical outcomes to our patients.

Each year GOSH spends a significant amount on administration activities. On top of this are the indirect savings and the opportunities that improved knowledge provides inpatient care transformation, outcomes and understanding.

We need to ensure that we are able to realise these benefits and accelerate high priority projects. We must understand the increasing digital information available and use the knowledge available from "big data" sources intelligently to identify service performance issues.

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AIMS

To ensure GOSH fully realises the benefits of the Digital Roadmap

By

Having a solid set of digital Key Performance Indicators across the organisation and monitoring performance to be undertaken by the Digital Governance Group

ACTIONS

Performance Reporting including Digital Uptake	Business Intelligence "Big Data"	Digital Prioritisation & acceleration
Define and publish the new KPI's in a new interactive digital dashboard	Develop a strong central business intelligence capacity in support of patient services and understanding clinical outcomes	'DRIVE' to oversee new digital service initiatives through business case, prioritisation and early stage development – allowing the benefits to be clearly articulated and quick wins accelerated.

Appendix A – Stakeholders/Contributors to the Digital Roadmap

Name	Department/Team/Title
Sarah Newcombe	Senior Nurse
Natalie Awash	Senior Nurse
Sally Bryan	ICT Clinical Systems Manager
Kelly Lamour	Dietetics / Therapies
Matthew Fenton	Cardiologist / Transplant Physician
Tim Liversedge	Anaesthetist
Robert Robinson	Neurologist
Cho Ng	Consultant Cardiac Intensivist
Adrian Carroll	EPMA Pharmacist
Ajith Kumar	Consultant Geneticist
Helen Aikenhead	
Laura Sinclair	Theatres Sister
Philip ancliff	Consultant Haematology-Oncology
Tariq Choudhry	Specialty Doctor - Private Patients
Rhiannon Evans	Cardiac / Ward Nursing
Christopher Jepson	Consultant ENT Surgeon
Catherine Peters	Consultant Endocrinologist
Daljit Hothi	Renal
Simon Hadley	ICT Imaging Systems Manager
Salinia Parkin	Head of Clinical Governance and safety
Robert Robinson	Consultant Paediatric Neurologist
Adrian Carroll	EPMA Pharmacist
Juliette Greenwood	Head Of Nursing
Maria Banaghan	QI Lead - Critical Care Flow
Sarah Metson	Division Manager
Laura Sinclair	Theatres Sister
Tim Liversedge	Consultant Paediatric Anaesthetist
Simon Blackburn	General Surgeon
Stephanie Williamson	Deputy Director of Redevelopment
Anupama Rao	Pathology
David Chatterton	Division Manager
Kshitij Mankad	Consultant Radiologist
Aneeta Parthipun	Interventional Radiology Consultant
Ajith Kumar	Consultant in Clinical Genetics
Neil Wimalasundera	Consultant in Paediatric Neurodisability
Simon Poole	Lab Medicine Systems & Information Service Mgr
Christine Morris	
Paul Gough	Service Manager for Genetics and Haemophilia

Name	Department/Team/Title
Matthew Fenton	Consultant, Heart Transplant
Luke Murphy	Pals Manager
Isobel Heymen	Consultant, CAMHS,
Rachel Bryant-Waugh	Clinical Psychologist, CAHMS
Allan Goldman	Consultant Cardiac Intensivist
Andrew Taylor	Consultant Cardiologist
Anne Layther	General Manager, Cardiology
Simon Heales	Consultant, Pathology
Raouf Chorbachi	Consultant Audio vestibular Physician
Herdip Sidhu-Bevan	Lead Nurse, A Patient Experience Lead
Chris Rockenbach	GM, IPP
Carolyn Akyil	Lead Nurse
Glyn Williams	Pain Service
Session with JM Barrie Division	Consultants, Service Managers, General Managers and HOCs
Margaret De Jong	Head of 'Psychiatry'
Daniela Nobre da Costa Pinto	Service Manager
Mary Glover	Consultant Dermatologist
Patient Exp Team	Emma James (Patient Involvement and Experience Officer) & Fiona Jones (Children & Young People Participation Officer) Suzanne Collin (PM, Patient Experience Team)
Padmanabham Ramnaryan	
Dagma Gohil	Assistant Chief Nurse
Sarah Newcombe	CSP
Sarah Ottoway	Head of Medical HR and PGME
Stephen Marks	Consultant Paediatric Nephrologist
Sheila Boyle	Renal Nurse Specialist
Nick Ware	Registrar - Renal

KEY:

One-to-One meeting	
Design Thinking Workshop 7/12/2016	
Attended Workshop	

Appendix B – Future State Journey Maps

Truly understand the users' pain points and daily needs, to transform their experience. Based on three identified personas:

Key Insights

The Patient

Reduce level of anxiety.

High level of anxiety, fear and uncertainty due to a lack of understanding about their illness, the hospital environment and the impact that this will have on their life.

Help maintain life as 'normal'.

Fear of missing out on their life as 'normal' by being at the hospital, as they will not see their friends, family, and that they will miss out on school.

Provide with personalied experience.

Patients can be isolated at the hospital and are looking for interactive connections, in addition to entertainment and activities that are according to their interest and needs.

The Parents

Streamlining appointments & coordination of care

Parents are taking on a lot of responsibility to manage their child's care and need better support and communication in order to free up time for parents to support their children.

Better understanding of care plan.

Lacking overview of the care plan, and access to education material, which they can access whenever from wherever to better understand results, progress and next steps.

Keeping parents & children connected.

Unable to perform activities from home, such as schedule/amend appointments or submit queries. They are forced to come into GOSH rather than have appointments from home.

The Clinician

Integrated patient view.

Information relating to one patient is not in one place, but relies on individuals to consolidate patient data and inform any relevant party of updates.

Appropriate level of care.

Clinical staff are not able to monitor patients remotely and easily predict impacts to their care plan of activities out of their control, but rely on patients to come in for an appointment.

Improved Collaboration.

Clinical staff don't have the capabilities to easily collaborate across geographical locations, in an efficient way, that will contribute to quality care leading best practices .

Key
Insights

The CEO

Predicted and real-time overview of performance

Need to have a predicted and real-time overview of staff, ward and hospital performance as a whole. This to better understand where workflow improvement and streamlining is needed, to ensure that the hospital is running at the highest level of efficiency while providing the best care and experience.

Predict future challenges.

In order to support decision making and future investments, there is a need to predict future challenges for the hospital, to enable smarter insights. There is a need to understand the organisational impacts from these challenges and the gaps that need to be filled to meet the needs.

Real-time adjustments supported by analytics.

Need for the ability to make real-time adjustments to daily processes (such as access, throughput and patient flow) and be confident that the changes made will trigger activities along the entire workflow, in order to ensure that the hospital is running efficiently.

Meet the
Personas.

Patient: Ben

A 9 ½ year old boy, referred from the local hospital with suspected Neuroblastoma (NBL).

He is bright boy and does well in school, where he has lots of friends. He is keen on games, in particular football, and is good with IT. Ben enjoys watching movies and being with friends. He is generally a happy boy. However, he is a fussy eater!

Parents: Mary & Robert

Mary and Robert are parents to Emma, who is almost 1 year old and an Outpatient at GOSH.

They are working parents. Mary is an English teacher and Robert is an engineer, who often has to travel a lot with work.

Meet the
Personas.

Clinician: Laura

Laura has been working at GOSH for 10 years and has to deal with a lot of patients on a daily basis, often patients that have to visit multiple departments.

Laura loves her job and helping children, and seeks to connect with clinicians globally to ensure that her patients receive the best care.

CEO: David

David started his career as a registered nurse and is CEO at the hospital.

He wants to promote a proactive, positive and supportive culture. While running an efficient hospital, while continuously maintaining the highest quality of care and patient support.

Patient Journey:

Ben

Preparing for the hospital visit.

Receiving early information

Shortly after the referral, Ben and his parents receive an email from GOSH, where Ben is recommended to download the patient app to prepare for his visit.

Ben logs into the app and is greeted by name, by his personal Avatar that already knows a bit about Ben.

Telling the hospital about himself.

Ben tells his Avatar that he loves playing video games with his friends, watch animated movies, and that his favourite food is spaghetti.

Getting personalised content.

Ben has already unlocked some rewards from answering the questions and can selects lots of animated movies to watch at the hospital, and games to play.

Ben can also see what other children at the hospital are doing. They are playing a football game on their app, and he adds it to his 'favourites' to play later.

Receiving a virtual hospital tour.

It's the day of travel and Ben is feeling very nervous. The Avatar asks Ben if he wants to take a tour of the hospital and find out more about the people he is meeting.

Ben takes a virtual tour and selects items in the rooms that the Avatar tells him more about.

In one of the rooms is the first doctor that Ben will be meeting today, Dr. Stevens, who tells him more about himself.

Preparation   Arrival   Patient Room   Connectivity   Support

Arriving at the hospital.

Taking a treasure tour.

Ben has arrived at the hospital. He is very nervous but recognises from the virtual tour that he is in the main reception hall.

Knowing that he has entered the hospital, the Avatar tells Ben about the ward that he is going to next and that he has unlocked a special treasure tour to take to get there. Using virtual reality, Ben selects to follow the avatar to his department.

The care team has been notified that Ben is in the building and can track where he is. They know the type of questions that Ben has been asking and his level of anxiety.

Familiarise with tools.

Along his treasure hunt, Ben collected a special wristband. While waiting for the care team, the Avatar tells him that he will be wearing the wristband throughout his stay at the hospital, and all the things that it can do.

The care team will be there shortly and Ben is curious to see what the wristband is like in real life.

Being positively distracted.

In the waiting room, Ben can also see a digital board where other children are selecting images and writing down words about how they are currently feeling.

Another board is showing events that are currently happening at the hospital. Together with his parents, they save events on the app so that they don't forget.

Preparation   Arrival   Patient Room   Connectivity   Support

Feeling looked after & more 'at home'.

Information & entertainment next to the bed.

Ben and his family are greeted by a nurse, that takes them to Ben's room. In the room, Ben can see that next to his bed is a digital device. He remembers the Avatar telling him that this is his own bedside information and entertainment device.

Ben sits down on the bed and the device has recognised that he is in the room and automatically logs him on. His avatar appears on the screen to welcome Ben to his room.

Smartbed enables automatic log-in based on patient recognition.

Educating & preparing the patient.

The nurse shows Ben that he also has a lot of information and education material about his illness and care plan on the device, and how he can directly ask any questions and filter information.

Ben and his parents select to hear more about the clinicians on his care team before they are to meet with them.

Preparation · Arrival · Patient Room · Connectivity · Support

Calling for assistance.

Before leaving the room, the nurse explains to Ben that if he has any questions he can use the device to directly call for a nurse to come to the room. He can also simply say his question and request out loud, as the room can be completely voice controlled.

The voice control allows the patient to change features in the room such as change the temperature, adjust the bed or ask questions. The settings are saved for when the patient returns to the hospital.

Understanding needs.

During his stay, Ben has not been eating very well, which his care team and parents have been noting down against his patient profile.

The avatar asks Ben if there is some food that he doesn't like and he explains that certain things on the menu have been making him feel ill. They go through new food options to update the food menu.

Order food from the room.

Out loud, Ben asks to order food for dinner and can instantly see the food menu on his bedside device. Ben is happy to see that a spaghetti dish is first on the list of food he might like! Together with his parents and brother, Ben orders and selects the time that he would like the food to arrive.

The new options will consider requirements from his care team along with preferences from Ben.

Preparation   Arrival   Patient Room   Connectivity   Support

Connecting within & outside hospital.

Staying connected with school.

To not miss out on school work, Ben is receiving course exercises from his teachers directly to his bedside device. He can also directly submit his work back for marking.

Ben would rather speak to his friends and family. However, since he has a deadline on his school work, he has to complete the exercises together with his hospital teacher first.

Staying connected with friends & family.

Once the school work has been submitted, Ben goes onto skype from his bed, to call his dad and brother. They haven't been able to visit for a few days, so Ben is happy to see them. Ben's dad is also able to be on skype while the clinician is going through the progress of Ben's care and the latest results.

After speaking to his family, Ben goes online to play computer games with his friends back home.

Preparation   Arrival   Patient Room   Connectivity   Support

Connect with other patients.

Ben has not been feeling very well after a recent treatment and has had to stay in his room in isolation to avoid catching an infection. He was looking forward to attending some activities at the hospital this week and is feeling lonely.

Knowing that he is in isolation, the avatar asks Ben if he wants to connect with other children across the hospital that are in a similar situation. Ben is feeling too shy to speak directly to them, however, he can see that some patients are playing a football game on their devices and joins to play the game together with them. After a little while of playing, he feels more comfortable and starts chatting while playing.

Patient activities based on needs.

Once Ben feels better and is able to leave his room, the bedside device is updated to tell him about events happening at the hospital that he can go to alone or with his parents.

Designing the patient experience.

He chooses to go to this weeks 'patient experience lab' where he can help design what he thinks a good and fun hospital looks like. He messages some of the patients that he has met online and they decide to all go together.

Knowing about his care, activities are adapted according to what Ben is able to do.

Preparation   Arrival   Patient Room   Connectivity   Support

Receiving continuous care & support.

Help patient through discharge.

Ben is ready to leave the hospital and his bedside device is automatically updated to say that that he is now in the discharge phase. Together with his parents, they go through information as to what this means and what the next steps are for when they go home.

Education material on the app will constantly keep updating, to reflect the type of information that patient needs to have as they are getting older.

Provide support & relevant education.

The nurse also goes through some things that Ben needs to think and be careful about when he is at home and the medication that he has to take. She shows Ben where he can access information and education material about his illness and care. Ben can contact his care team by writing, sending a voice or video message.

He doesn't have to worry about forgetting to take his medication, as the Avatar has already set up reminders for him on the app.

Provide easy & direct communication.

The nurse explains that Ben is still able to use his app from home, where he can ask any questions that he might have.

Ben is happy to hear that he can still connect to other patients at the hospital, as he has made some friends and want to keep playing games together with them.

Preparation   Arrival   Patient Room   Connectivity   Support

Parent Journey:

Mary & Robert

Preparing for the hospital visit.

Receiving helpful reminders.

The day before the visit, Mary & Robert are alerted with a reminder that Emma should not be eating any breakfast due to the tests that she has to take at the hospital first thing in the morning. They are given advise on how to manage this and what Emma could eat the evening before to help her.

They are provided with logistic specific information. Since Robert is going to drive there, he looks at the site map and selects to schedule parking for the day.

Having all info in one place.

Mary & Robert are happy to see that the information provided to the local hospitals and the GP is all in one place against Emma's profile, along with any comments that they have made. It fills them with confidence that nothing has been missed out, and are relieved that they don't have to provide the care team with this information themselves.

Receiving early information.

Mary and Robert have just received a referral from their local hospital to go to GOSH in a week's time for Emma's first appointment. At the same time, they are informed of the patient portal that will give them access to information relating to Emma's care plan, at any given time and place.

Easily updating patient info.

However, they forgot to mention that Emma has been showing some signs of food allergy recently, and add the comments directly against her profile.

Preparation   Arrival   Appoinments   Remote Care   Connectivity

Arriving at the hospital.

On the day preparation.

On the way to the hospital, Mary is using her phone to read up on the care team that they will be meeting today, and looking through the appointments scheduled. She feels confident that the hospital has used their time efficiently, and she can with confidence focus on just looking after Emma.

Notified of delays.

While in the car, Mary & Robert are notified that there is currently a 20min delay to Emma's first appointment, along with the reason. They are given recommendations on things they can do while waiting, such as cafés and parks close by, or events at the hospital.

Mary confirms that they are still due to arrive on time.

Instantly notified.

Shortly later, they get a notification that the care team is ready to see Emma, along with directions to where they need to go.

Check in & easy directions.

Arriving at the hospital, Mary uses her phone to 'check in', informing the care team that they are ready to see them. Using the site map, they search for one of the activity rooms close by, to keep Emma entertained and distracted. They get directions directly on their device.

Preparation — Arrival — Appoinments — Remote Care — Connectivity

Attending Appointments.

Instant updates to profile.

Mary & Robert attend the first appointment with Emma, where the clinician explains about the medication that Emma will start taking, and triggers the order directly from the device in the room. The patient portal is instantly updated, and they walk through how Emma should be taking her medication, and Mary sets some reminders.

Using their time efficiently.

There is a gap between Emma's appointments so Mary and Robert take her outside for a walk. They soon receive a message. The appointment that one of the clinicians in their care team would like to see Emma, wasn't originally planned, however, the clinician had a slot free and could see that Emma and her parents are at the hospital.

They happily accept the request, as this means that they don't need to come back to see the clinician at a later stage as planned but can do everything in one day.

Get instant access to results.

Emma has been to all of her appointments and it is time to go home. However, before they leave, Mary wants to make sure that everything was ok with the blood tests. She looks at the test status on her mobile can see the results. There is also a message from their clinician ensuring no further action needs to be taken.

Preparation   Arrival   Appoinments   Remote Care   Connectivity

Remote care & support.

Easy access to care plan from home.

Once at home, Mary and Robert are a bit overwhelmed with everything that they have to keep in mind. It is a relief that they can access all the notes from home, including next steps and actions. They are also happy to see that they can ask questions and submit queries directly to their care team, as well as connect with other families.

Monitoring the patient remotely.

Emma has been having some fever and is showing some signs of a rash. Mary has been entering all the results onto the portal. They soon get a message from a nurse saying that they recommend Mary and Robert to have a consultation with a clinician to gather some more details on Emma's condition. They schedule a virtual meeting.

Information gathered across against the patient profile is analysed and alert is triggered to care team if attention is needed, to predict future complications.

Setting up a check-list.

They set up a daily checklist on their phone, where they can also enter results as needed.

Preparation   Arrival   Appointments   Remote Care   Connectivity

Attending a virtual appointment.

During the virtual appointment, Mary and Robert provide the clinician with information as needed. They are able to directly upload pictures of the rash that Emma has been showing signs of.

Since Emma is due for an appointment in a few days, the clinician determines that they should keep adding the results into the portal from home. He also prescribes medication for the rash, that is instantly available to collect from their local pharmacy.

The portal is updated with the details of the medication and instructions on use.

Easily amending appointments.

Emma is due for an appointment at GOSH in 3 days, however, Robert has a family emergency and will no longer be able to make the appointment. Using the portal, he can see that Emma's appointment is available for reschedule, within a set timeframe. He selects a reschedule in the next couple of days and gets a confirmation that it has been approved.

Accepting ad-hoc appointments.

A few hours later, they receive a request to add another appointment to their day, this time with a diabetics consultant they were meant to see the following week. They accept and appointment details are added to their portal.

Preparation   Arrival   Appoinments   Remote Care   Connectivity

Connect within & outside the hospital.

Connecting with other parents.

Mary has been facing some challenging questions from Emma and is not sure how to speak to her about her illness and hospital visits, to make her less nervous.

She uses the portal to search for information and is recommended to look at the 'patient journals' submitted by parents and patients. Janet also connects with some parents on the parent forums and they decide to meet up next time Mary is at the hospital with Emma.

Submitting & tracking feedback.

Mary and Robert are prompted to provide with some feedback. They have overall been very happy with the experience, however, they submit some future suggestions for improvement. They can instantly see the status of their feedback.

They have in particular found the patient journals' from other parents very useful, and decide to submit one of their own from home.

Preparation   Arrival   Appoinments   Remote Care   Connectivity

Clinician Journey:

Laura

Preparing for patients.

Simple sign-on.

Laura is just about to start her shift. She approaches the clinical station, which recognises that she is present and automatically logs her in.

Overview of appointments & predicted time.

Laura is able to see that she has 10 appointments today and she selects to read a quick patient summary of her appointments. Each appointment has been adjusted in real-time, to give Laura a better understanding of the predicted time each appointment will take. Laura selects to look at the patient record for her next appointment.

All patient info in one place.

Laura has a notification that her next patient has just left an appointment at another department and that the patient record has been updated with the results that are relevant to Laura. She can also easily see new information added from local hospitals, the patients wearables and the parents.

Laura can see that her patient's blood tests are due in the next 30mins.

Preparation   Appointment   Nursing Station   Connectivity

Tracking the patient & equipment.

Visually displayed on the digital board, Laura can see a layout of the unit and can track people and equipment across the hospital.

She filters out to see exactly where her next patient is, and understands that they are expected to arrive in their room in 30mins. This gives Laura enough time to go through some more information on the patient record.

Attending patient appointments.

Easy capture of patient info.

Laura receives a notification that her patient is in the bed.

Laura visits her patient to take the necessary tasks. Weight, blood pressure and temperature is taken by lying on the bed. All Laura has to do is scan her patient's wristband and the information is automatically updated onto the patient chart.

Receiving patient alerts.

In addition to other departments, her patient has been visiting local hospitals and using wearables to track her well-being. All the data has been updated onto her patient record and has now alerts Laura of the specific areas relevant to her.

Preparation   Appointment   Nursing Station   Connectivity

Easily revise info with patient.

Laura simply logs on to the bed side device, which brings up information on the patient record and the care plan, translated into a natural language. This makes it easy for her to review the information with the patient.

The voice recognition is set up for the patient as well as relevant members of the care team to use.

Easy communication across the department.

Once Laura is finished with the patient, she uses the voice recognition system to inform the nurse to bring the patient some more pain-relief medication.

Trigger info to other departments.

She explains the care plan and directly adds comments. Submitted data has automatically alerted other relevant departments, and Laura is able to show exactly who the information has been shared with and what they are expected to do with it.

Preparation   Appointment   Nursing Station   Connectivity

At the nursing station.

Ability to prioritise requests.

Laura's message instantly comes up at the nursing station, and alerts the relevant nurse so that she can prioritise her requests.

The nurse can also see that Laura's medication has just become ready for collection at the nursing station and decides to do everything at once.

Confidence in procedures.

Upon giving the medication, the nurse scans the wristband and medication to ensure it is the correct medication. As there is no alert, she is confident that the latest test results have not had any impacts.
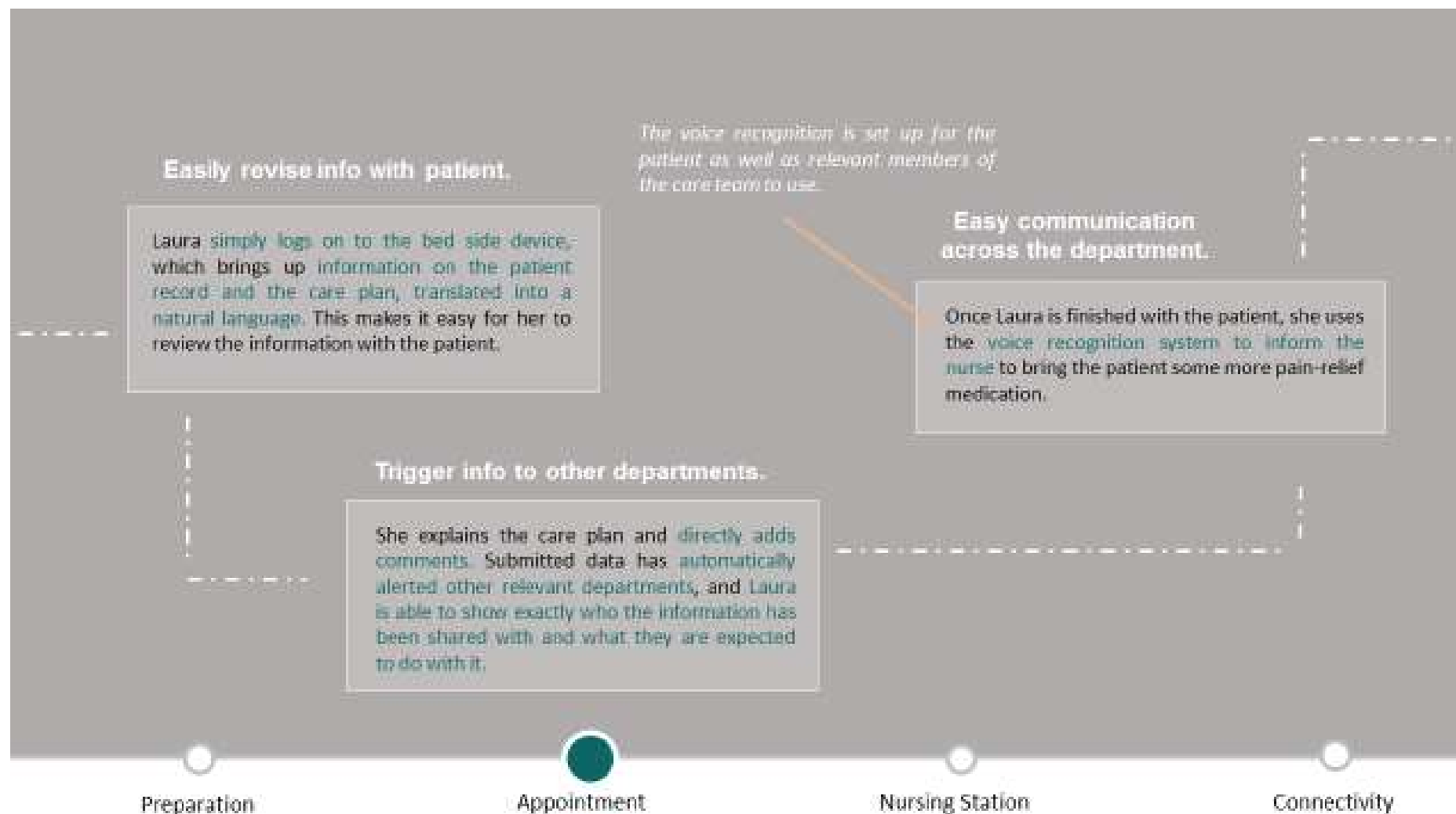
Preparation   Appointment   Nursing Station   Connectivity

Help with predicting future problems.

Laura's has gone outside for lunch and gets a notification on her phone that one her patient's blood results are ready and are showing signs of high blood sugar level. Combined with other results on the profile, she is alerted that her patient might be showing early signs of diabetes.

Connecting with other clinicians.

Collaborate with clinicians virtually.

Laura attends the virtual session with the consultant from diabetic care and their conversation is automatically captured, to be added to the patient profile.

During the session they go through the pre-analysed info against the profile and can also easily access and can curate latest literature relevant to the case.

Recommendations to help with next best action.

Laura is given analysis on impacts to her patient's care plan, and recommendations on how to proceed. She uses her device to ask detailed questions to analyse the results further.

Easily share info & connect with clinicians.

Laura decides to connect with a consultant in diabetic care. She sends an instant request to one of the recommended consultants, to schedule a virtual session.

A summary of the patient data is automatically created and sent across along with the invite, along with the earlier blood results.

Preparation   Appointment   Nursing Station   Connectivity

Quick view of the day.

David has an early start to the day. He has a coffee and reviews the daily schedule on his dashboard along with any messages and notifications from his direct team.

Prepare for the day.

Predicting patient flow & capacity.

On the way to work, David wants to get an overview of the amount of patients at the hospitals to understand staffing and capacity.

Today the real-time patient amount is higher than predicted, which is impacting on beds and staffing.

David can see that based on the current scheduling, there are some recommended adjustments that will make the hospital run with even greater efficiency.

Adding items to the agenda.

Later this afternoon, David is attending the weekly meeting with the senior board. Part of the session is to review staff, patient/family and NHS satisfaction.

Based on analysis of feedback submitted across sources, David can easily review feedback from staff and patients. The staff is mainly commenting on the meeting rooms while the patient comments are concerning the wifi.

David simply selects to add the topics to the meeting agenda under the relevant slot.

Preparation   Daily Activities   Priorities   Connectivity

Easily adjusting & optimising daily processes.

The action plan suggested for the day is automatically revised and optimised, to give David recommendations on how to adjust hospital capacity, and the level of efficiency that this will result in.

He can approve the recommended changes, which automatically adjust the plan and alerts relevant parties of the change. He can also make manual amendments or choose to ignore and proceed as is.

Meet & greet staff.

Having all the information he needs on his dashboard, David has freed up some time in the morning and can walk past different departments to say 'hi' in person.

Performing daily activities.

Acknowledging high performers.

David has received a notification that the staff at the Outpatients Reception has been getting very positive feedback from patients/family. He saves the feedback, which automatically triggers a message to the comms team to use the feedback in the next internal 'proud moments' newsletter and on the internal Facebook page.

David takes the route past the Outpatients Reception to share the feedback with them.

Preparation   Daily Activities   Priorities   Connectivity

Provide support to staff.

David can also see that the ward for MRI will be particularly busy today, based on the hospital heatmap on the dashboard. With time freed up as he has the analytics at his hands, he decides to go past the ward to see that they have everything they need.

Add meetings to the calendar.

David accepts the invite from the Chief Nurse to attend a meeting, along with the heads of each ward, that is automatically added to his calendar to mark his unavailability. Together they can discuss reasons and revise the cost and quality goals they had set in place against their departments, to consider if improvements are needed.

Easily understand performance.

David has received a notification from the Chief Nurse regarding one of the wards, flagging that it has been showing signs of decreasing productivity compared to previous months and other benchmarks. However, the patient/parent feedback still remains unchanged and very positive.

Get an overview of the hospital department 'network'.

On the hospital network map, David can see who the ward is working in close collaboration with and the breakdown of productivity between the wards. The Chief Nurse has brought to his attention that the productivity seems particularly low between two wards.

Preparation   Daily Activities   Priorities   Connectivity

Prioritisation & Unplanned Issues

Insight into future challenges.

David has been working hard on transforming the hospital and developing a strategic vision. Based on analytics, the main challenge currently facing the hospital is the increasing patient demand for care and unavailability of beds. He needs to create a strategy for how to expand, while still providing patients with the best experience and highest quality of care.

Reviewing staff suggestions.

One of the specialists in neuro-disabilities has put together a business case on how to use electronic consultation to alleviate pressures on out-patient appointments. David has received the executive summary for review, before the board meeting.

Analyse initiatives & predict benefits & impacts.

Based on multiple sources of data, David can see predictions such as type of illness and care required overtime/on site, demographics and geographical areas. Along each prediction, He can see an estimated GAP analysis of the capabilities the hospital would need to have to support the transformation as well as the organisational impact that this will have. He can see the expected benefits from the business case, against the changes required.

He decides to take the business case in for final review at the board meeting.

Preparation   Daily Activities   Priorities   Connectivity

Discussing findings & analysis in board meeting.

David attends the board meetings, where he can use the dashboard to discuss the findings and analysis. The board decides to approve the business case, which notifies the initiative owner. Notes from the meeting are automatically captured through dictation for the board secretary to review and distribute as appropriate.

Connect within & outside the hospital

Revising candidates for new hires.

David has been looking to hire a Chief of Experience, and has requested profiles based on a set of requirements. On his way to the talk, David is looking through a list of recommended candidates. He can see a list based on the direct requirements he set in the tool.

Connect with patients & families.

David is ending his day with a CEO talk at the Town Hall for patients and families, to share vision messages and the mission of GOSH. Using external and internal social channels, he has requested patients and families to submit topics that they would like to hear more about. He is also excited to share news on the work that the hospital is planning to do, to improve patient

Preparation   Daily Activities   Priorities   Connectivity

Extended list of candidates.

David can also see a recommended list that has been based on analysis of skills and experience that is considered relevant to the role, across industries and geographies. David is happy to see that there is an extensive list of candidates across industries he had not thought about.

He is in particular interested in a candidate that has extensive experience from the hotel industry, who is currently living in New York.

Read summary of policies.

David then continues to read a summary of a new policy document sent across from NHS, which is easily showing the key points and how they relate to previous policy initiatives. This makes it easy for David to focus on new information instantly.

He is glad to see that the new reports on improving health and services using technology is exactly in line with his earlier set initiatives.

Request candidate for interview.

David highlights the candidate as 'high interest', which triggers the relevant message to HR to send the candidate the initial invite for an electronic interview.

Results at the end of the day.

While travelling home for the day, David uses this time to look at some reporting, such as length of stay. He can see that the adjustment made earlier this morning to scheduling and staffing helped to increase the efficiency at the hospital during the day.

Preparation   Daily Activities   Priorities   Connectivity